Assembly and operating instructions

Gas condensing boilers

MGK-130
MGK-170
MGK-210
MGK-250
MGK-300

These installation instructions are to be retained by the user.
We cannot accept any warranty claims if these operating instructions have not been observed.

Wolf GmbH · Postfach 1380 · D-84048 Mainburg · Tel. +49-8751/74-0 · Fax +49-8751/741600 · Internet: www.wolf-heiztechnik.de

Document no. 3062880_201305 Subject to technical modifications

GB

Contents

Contents ..... Page

Safety instructions 3-4
Standards and regulations 5-6
Layout MGK 6
Specification 7
Control / Function / Operation 8-9
Delivered condition / Connections 10
Installation instructions 11
Installation instructions / Dimensions 12
Dismantling, casing 13
Boiler system pipework 14
Installation 15-17
Installation, combustion air supply / flue system 18
Electrical connection 18-22
Filling the system / filling the siphon 23
Checking the gas supply pressure 24
Commissioning / Setting the BUS address 25
Displaying / modifying control parameters 26
Limiting the maximum output 27
Changing the gas type / CO_2 settings 28-30
Testing the combustion parameters 31
Commissioning report 32
Technical information, water treatment 33-34
System log 35
Engineering data 36
Engineering information, combustion air / flue gas routing 37-43
Wiring diagram MGK-130 44
Wiring diagram MGK-170 - 300 45
Troubleshooting 46-47
Resistance table 48
Notice 49-51
EC declaration of conformity 52

The following symbols and references are used in conjunction with these important instructions concerning personal safety, as well as operational reliability.

"Safety instructions" are instructions with which you must comply exactly, to prevent risks and injuries to individuals and material losses on the boiler.

Danger from 'live' electrical components!
NB: Switch OFF the ON/OFF switch before removing the casing.

Never touch electrical components or contacts when the ON/OFF switch is in the ON position! This results in a risk of electrocution that may lead to injury or death.

The main supply terminals are 'live' even when the ON/OFF switch is in the OFF position.

NB **"NB" indicates technical instructions that you must observe to prevent material losses and malfunctions on the boiler.**

This unit is neither due to be used by persons (including children) with physical, sensoric or mental handicaps nor by users missing the required experience and/or knowledge unless being supervised and instructed about its application by a person being } responsible for their security.

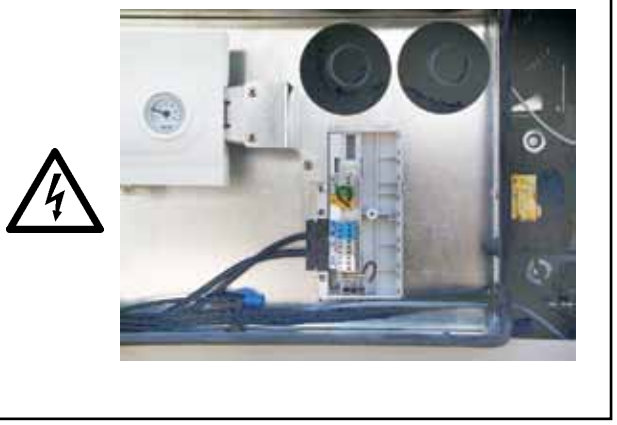


Fig.: Junction box MGK-170/210/250/300
Danger from electrical voltage

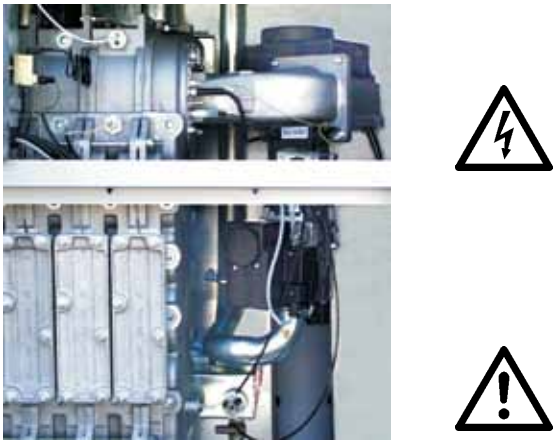


Fig.: Ignition transformer, high voltage ignition electrode, combustion chamber
Danger from 'live' electrical components, risk of burning through hot components

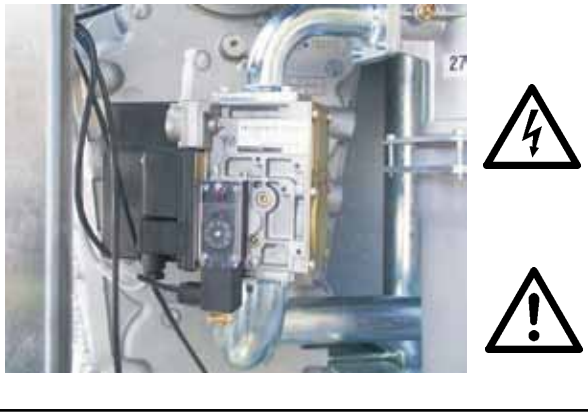


Fig.: Gas combination valve MGK-170/210/250/300
Danger from electrical voltage
Escaping gas may cause poisoning or the risk of explosion

Safety instructions

The following regulations and rules have to be adhered to during installation, commissioning, maintenance and service:

The installation may only be operated in technically perfect condition. Perturbances and damages affecting safety have to be eliminated at once.

When setting the sanitary hot water temperature above 60°C or when activating the anti-legionello function with a temperature exceeding 60°C it has to provided a corresponding fresh water admixture (risk of scalding).

The perfect function of the electrical equipment has to be checked periodically.

Perturbances and damages may only be eliminated by expert technicians.

Damaged components may only be replaced by genuine Wolf spare parts.

Prescripted electrical fuse values have to be adhered to (see technical data).

Any damage resulting from technical modifications to Wolf control units is excluded from our liability.

The appropriate European and electrical safety regulations as well as the corresponding regulations of the Energy Supply Company have to be adhered to during the installation and execution of electrical works.

It is not allowed to remove, shunt or invalidate safety and monitoring facilities!

Obtain the permission of your mains gas supplier and flue gas inspector prior to the installation of Wolf gas fired boilers [where appropriate].

Wolf gas fired boilers must only be installed by a recognised heating contractor. This heating contractor will also be responsible for the proper installation and commissioning of the heating system.

The following regulations, rules and guidelines must be observed during installation:

- VDE 0722 / EN50165 Electrical equipment of heat generators with non-electrical heating systems
- DIN EN 12828 Heating systems in buildings, designing hot water heating systems
- EN 60335-1 Safety of electrical equipment for domestic use and similar purposes
- VDE 0470 / EN 60529 Protection through housings
- EN 12831 Method for calculation of the design heat load
- EN 13384 Chimneys - Thermal and fluid dynamic calculation method

⚠ Any damage or loss resulting from technical modifications to the control unit or to the control components are excluded from our liability.
Incorrect use can lead to a risk to life and limb or to a risk of material losses.

Note: Please read these instructions carefully before the installation and keep them in a safe place. Please also note the technical information in the appendix.

Requirements

The installation of the boiler must be in accordance with the relevant requirements of Gas Safety (Installation and Use) Regulations 1998, Health and Safety Document No. 635 (The Electricity at Work Regulations 1989), BS 7671 (IEE Wiring Regulations) and the Water Supply (Water Fitting) Regulations 1999, or The Water Bylaws 2000 (Scotland). It should also be in accordance with the relevant requirements of the Local Authority, Building Regulations, including amendments to the Approved Documents Part L and J 2002, The Building Regulations (Scotland), The Building Regulations (Northern Ireland) and the relevant recommendations of the following British Standards:

BS 5440: Flues and ventilation of gas fired boilers not exceeding 70 kW net:
- Part 1: Flues
- Part 2: Ventilation

BS 5449: Specification for forced circulation hot water for domestic premises.
BS 5546: Specification for gas hot water supplies for domestic premises.
BS 6700: Services supplying water for domestic use within buildings and their curtilages.
BS 6798: Specification for installation of gas fired boilers not exceeding 60 kW input.
BS 6891: Specification for installation of low pressure gas pipework up to 28 mm (R1") in domestic premises (2nd family gas).
BS 7593: Treatment of water in domestic hot water central heating systems.

Institute of Gas Engineers Publication IGE/UP/7/1998:
"Guide for gas installations in timber framed housing"

Important: The appliance must be installed and serviced by a competent person as stated in the Gas Safety (Installation and Use) Regulations 1998. In IE, the installation must be in accordance with the current edition of I.S,813 "Domestic Gas Installations", the current Building Regulations and reference should be made to the current ECI rules for electrical installation.

When tightening or loosening threaded connections always use suitable open-ended spanners (not pipe wrench, or extensions, etc.). Incorrect use and/or unsuitable tools can lead to damage (e.g. gas or water leaks)!

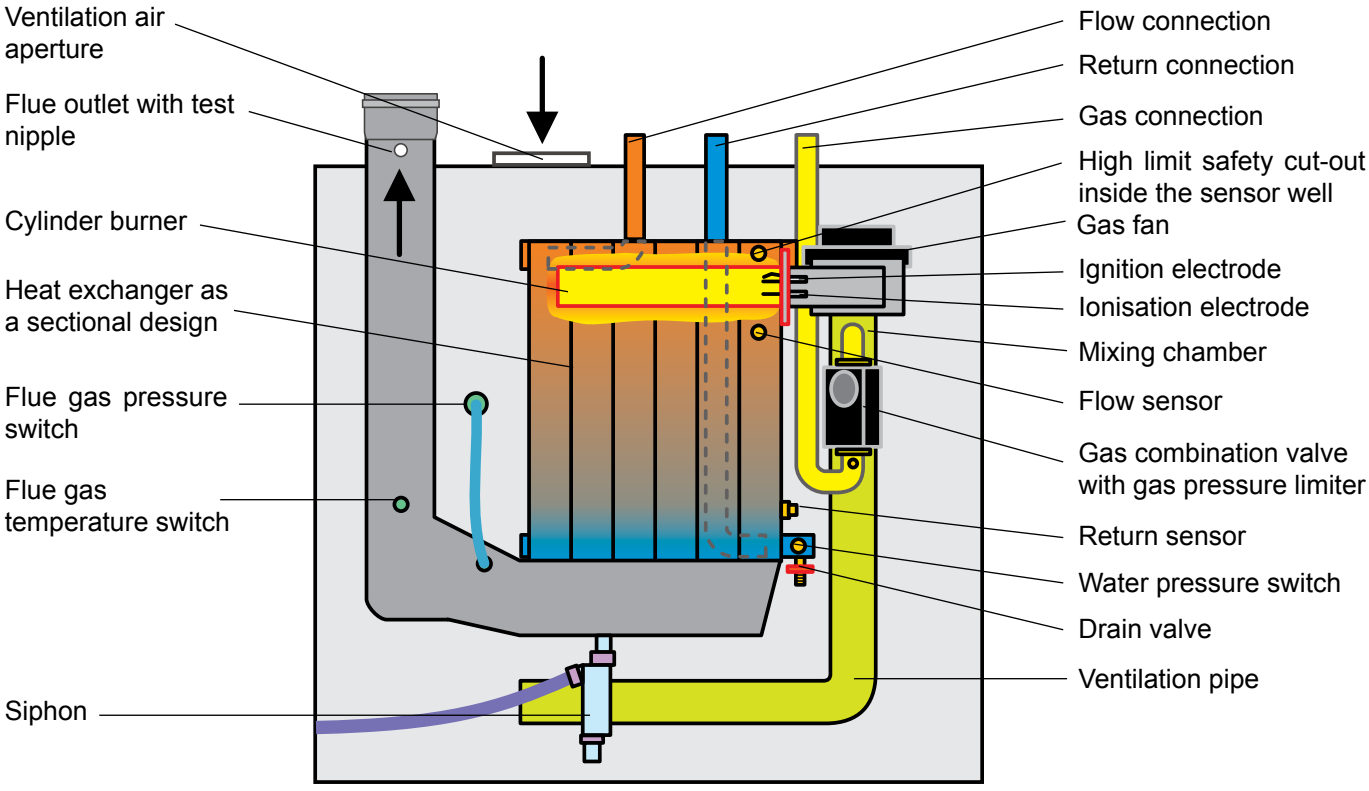
Gas condensing boiler MGK-...

Gas condensing boilers according to EN 437 / EN 483 / EN 677 and EU 90/396/EEC (Gas Consumer Equipment), 92/42/EEC (Efficiency Directive), 2006/95/EC (Low Voltage Directive), and 2004/108/EC (EMC Directive), with electronic ignition and electronic flue gas temperature monitoring, for low temperature heating and DHW heating in heating systems with flow temperatures up to 90 °C and 6 bar permissible pressure according to EN 12 828.

Fig.: Wolf gas condensing boiler

Open flue gas condensing boilers must only be installed in a room which complies with the appropriate ventilation requirements. Otherwise there is a risk of asphyxiation or poisoning. Read these installation and maintenance instructions before installing the boiler. Also take the technical engineering information into consideration.

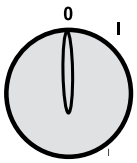
Layout MGK



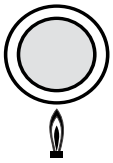
Specification

Type	MGK	130	170	210	250	300
Rated output at 80/60 °C	kW	117	156	194	233	275
Rated output at 50/30 °C	kW	126	167	208	250	294
Rated heat input	kW	120	160	200	240	280
Low boiler output (modul.) at 80/60 °C	kW	23	27	34	39	45
Low boiler output (modul.) at 50/30 °C	kW	24	30	37	44	49
Low heat input (modulating)	kW	23	28	35	41	46
Heat input modulation range	%	19-100	17-100	17-100	17-100	17-100
Height	A mm	1300	1300	1300	1300	1300
Width	B mm	995	1355	1355	1355	1355
Depth	C mm	600	600	600	600	600
Flue diameter	mm	160	160	160	160	200
Combustion air supply	mm	160	160	160	160	160
Heating flow outside diameter	G	1½"	2"	2"	2"	2"
Heating return outside diameter	G	1½"	2"	2"	2"	2"
Gas connection	R	1"	1½"	1½"	1½"	1½"
Balanced flue routing	Type	B23, B33 C33, C43 C53, C63 C83	B23, B33 C33, C43 C53, C63 C83	B23, B33 C33, C43 C53, C63 C83	B23, B33 C33, C43 C53, C63 C83	B23, B33 C33, C43 C53, C63 C83
Gas category		II_{2H3P}	II_{2H3P}	II_{2H3P}	II_{2H3P}	II_{2H3P}
Gas supply details:						
Natural gas H (H_i = 9.5 kWh/m³ = 34.2 MJ/m³)	m³/h	13.1	16.8	21	25.2	29.4
LPG P (H_i = 12.8 kWh/kg = 46.1 MJ/kg)[1]	kg/h	9.7	12.5	15.6	18.7	21.8
Gas supply pressure: Natural gas E/LL	mbar	20	20	20	20	20
LPG P	mbar	50	50	50	50	50
Water capacity, heating water heat exchanger	l	12	15.4	16	20	22
Max. permissible boiler pressure	bar	6	6	6	6	6
Max. permissible flow temperature	°C	90	90	90	90	90
Available gas fan draught	Pa	10-200	10-150	10-150	10-150	10-150
Flue gas temperature 80/60-50/30 at Q_{max}	°C	65-45	65-45	65-45	65-45	65-45
Flue gas temperature 80/60-50/30 at Q_{min}	°C	55-35	55-35	55-35	55-35	55-35
Flue gas mass flow rate	g/s	56.7	72.6	90.8	108.9	127.1
Flue gas group according to DVGW G 635		G52	G52	G52	G52	G52
Pressure drop, heating water	mbar	95	100	115	135	160
Electrical connection	V~/Hz	230/50	230/50	230/50	230/50	230/50
Integral fuse (medium slow)	A	5	5	5	5	5
Power consumption	W	30-200	45-280	45-280	45-280	45-350
Protection		IP40	IP40	IP40	IP40	IP40
Sound pressure level inside the installation room at full load [1]	dB(A)	<54	<54	<54	<54	<54
Total weight (dry)	kg	195	250	271	292	313
Condensate volume at 40/30 °C	l/h	12	16	20	24	28
Condensate pH value		approx. 4.0	approx. 4.0	approx. 4.0	approx. 4.0	approx. 4.0
CE ID		0085BR0117	0063BQ3805	0063BQ3805	0063BQ3805	0063BQ3805

[1] This value is dependent on the general system conditions, such as: Type/version of the flue system, size and nature of the installation room



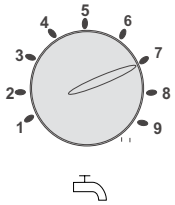
ON/OFF switch
The condensing boiler is OFF in position 0.



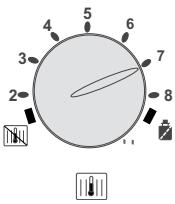
Reset
A fault is reset by pressing the reset button which will also restart the system. Pressing the reset button re-activates the system, if there was no fault.

Illuminated status indicator ring

Display	Explanation
Flashing green	Standby (power supply ON, no heat demand)
Constant green light	Heat demand: Pump running; burner OFF
Flashing yellow	Emissions test mode
Constant yellow light	Burner ON; flame steady
Flashing red	Fault



DHW temperature selection (only with 3-way valve)
When gas condensing boilers are combined with a DHW cylinder, setting 1-9 corresponds to a cylinder temperature of 15-65 °C. The DHW temperature selector setting becomes ineffective when the system is combined with a digital room thermostat or a weather-compensated controller. The temperature will then be selected at the controller (accessory).



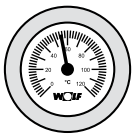
Heating water temperature selection
Settings 2 - 8 correspond, when factory-set, to a heating water temperature of 20-85 °C. The heating water thermostat setting becomes ineffective when the system is combined with a digital room thermostat or a weather-compensated controller.

Settings

Winter mode (position 2 to 8)
In winter mode, the boiler heats the heating water to the temperature selected at the heating water controller. According to the pump operating mode, the circulation pump operates constantly (factory setting) or only in parallel with the burner activation / run-on period.

Summer mode
Winter mode is disabled by rotating the heating water temperature selector into position . In other words, the boiler will then operate in summer mode. Summer mode (heating OFF) means only DHW heating. Frost protection for the heating system and pump anti-seizing protection, however, remain enabled.

Emissions test mode
The emissions test mode is activated by rotating the heating water temperature selector into position . The indicator ring flashes yellow. After the emissions test mode has been activated, the boiler will heat with the set maximum output. Any previous cycle block will be cancelled. The emissions test mode terminates after 15 minutes or when the maximum flow temperature has been exceeded. To reactivate, turn the heating water temperature selector anti-clockwise and then back into position .



Thermometer
The current heating flow temperature is displayed.

Anti-seizing pump protection
In summer mode, any connected circulation pump operates for approx. 30 seconds after a maximum idle period of 24 hours.

Note:

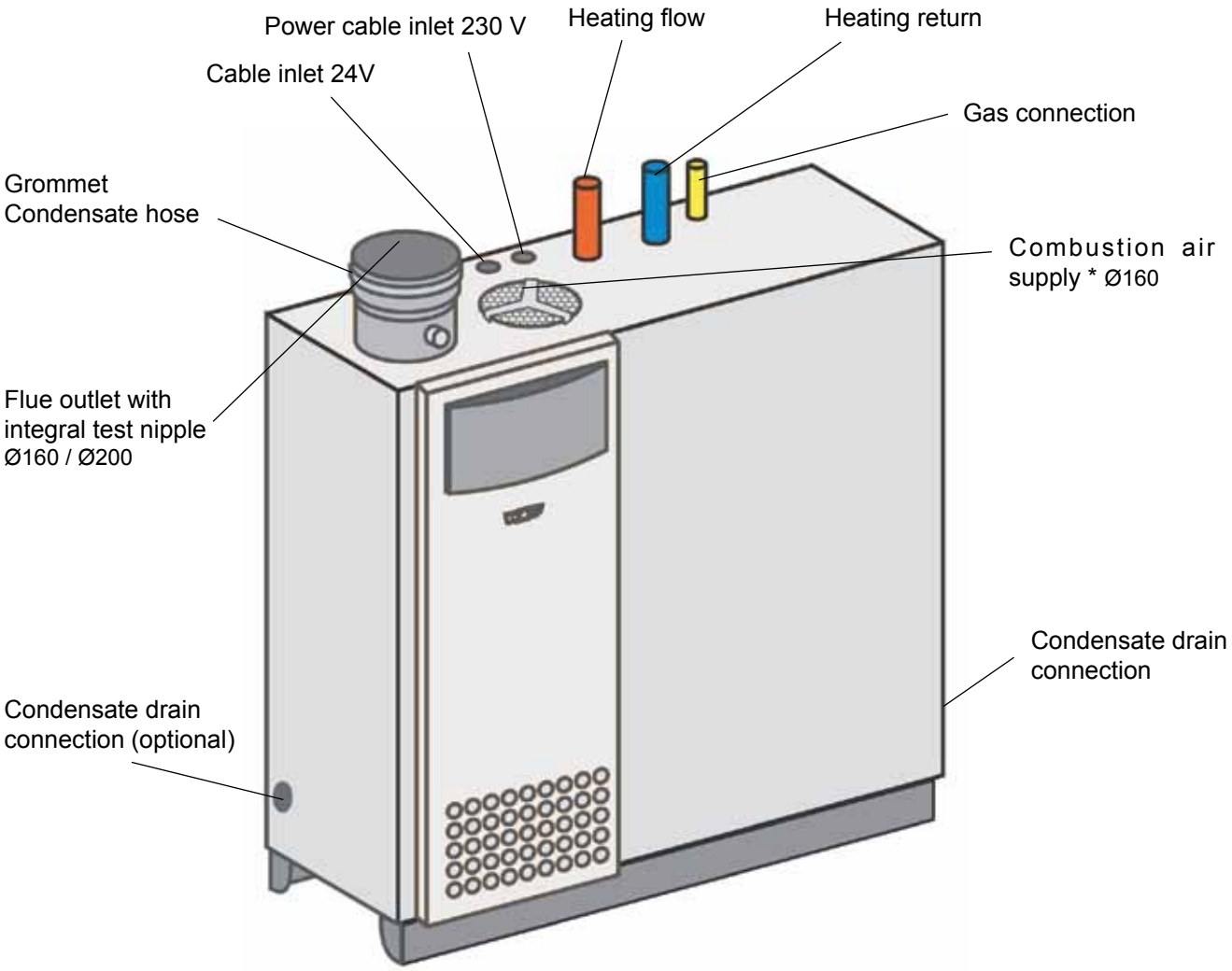
The number of times the condensing boiler can be started in heating mode is limited electronically. This limit can be bypassed by pressing the reset button. Then, the boiler starts immediately, as soon as a heat demand has been issued.

Delivered condition

The standard delivery includes:

1 Gas condensing boiler, fully wired
1 Technical guide and installation instructions
1 Operating instructions
4 Lifting slings

Connections



* Connection for balanced flue operation with ventilation air adaptor (accessory)

General tips regarding location

- The boiler should be installed on a level surface which is substantial enough to carry its weight.
- The boiler must be level (level with adjustable feet).

NB The boiler must only be installed in a room that is protected from frost.
Drain the boiler and the entire heating system if there is a risk of frost, when the system has been shut down, to prevent pipes from bursting.

NB Boilers should not be installed in areas subject to aggressive vapours, very dusty or highly humid conditions (workshops, laundry rooms, hobby rooms etc.). This prevents the optimum burner function from being achieved.

⚠ The combustion air supplied to the boiler must be free from halogenated hydrocarbons (e.g. as contained in sprays, solvents, cleaning fluids, paints and adhesives). Under the most unfavourable conditions, these may lead to pitting of the boiler and even the flue gas system.

⚠ Never store or use combustible material or liquids near the boiler.

⚠ The ventilation air supply must be ensured and comply with local regulations or those relating to gas installations. When there is an insufficient supply of ventilation air, **flue gas can escape leading to a risk to life (poisoning/asphyxiation).**

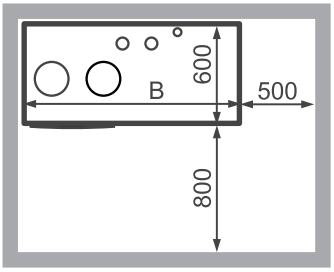
Prior to commissioning, ensure with the appropriate authorities, whether a neutralising system for condensate is required.

Recommended minimum wall clearances

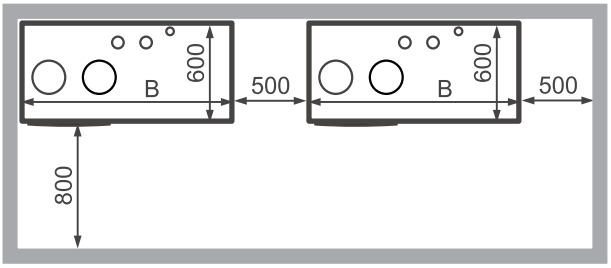
The boiler can be positioned close to the wall, both at its back and its left side.
On the right side, a clearance of at least 500 mm is required to enable the burner removal and installation.

An adequate amount of space must also be provided in front of the boiler to enable cleaning and service.

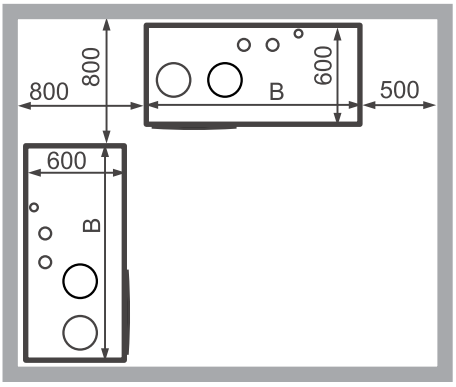
Dim. B	MGK-130	995 mm
Dim. B	MGK-170/210/250/300	1355 mm



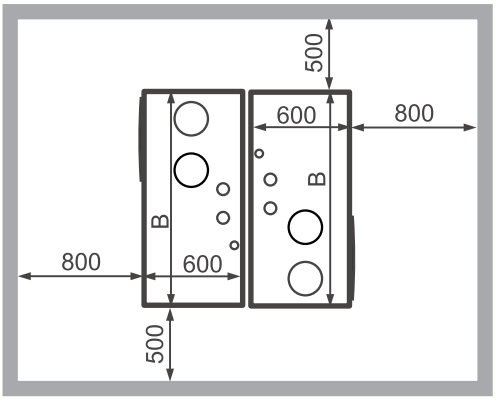
Boiler in the installation room



2 - 4 boilers in the installation room, side by side



2 boilers in the installation room



2 boilers in the installation room, back to back

Transportation into the installation room

To ease the transportation into the boiler room, lifting slings are supplied with the boiler.

NB Never use sack trucks.

Fig.: Lifting eyes for lifting slings

Levelling the boiler with the adjustable feet

At the factory the boiler is equipped with four adjustable feet.

- Level the boiler with the adjustable feet, spanner size 13).

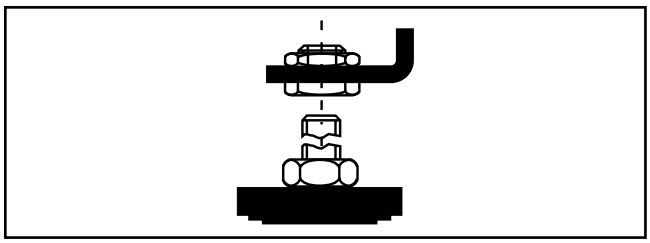


Fig.: Feet

Dimensions

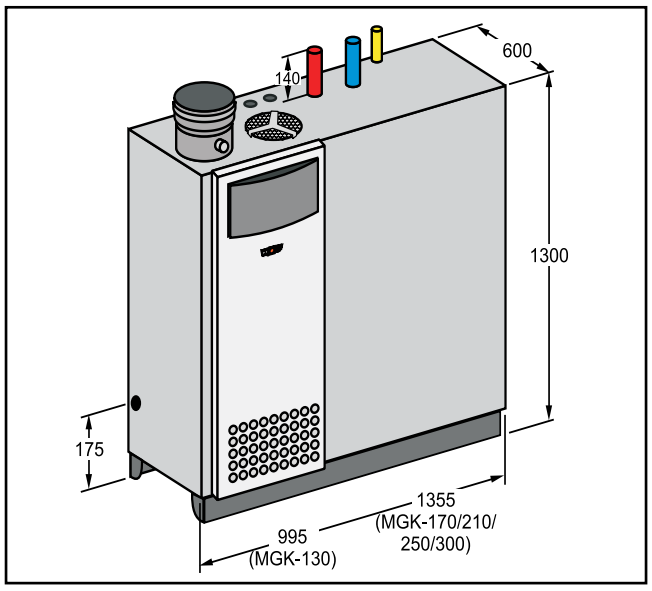


Fig.: Dimensions
(Total height incl. connector
MGK-130 ... 250 = 1460 mm
MGK-300 = 1510 mm)

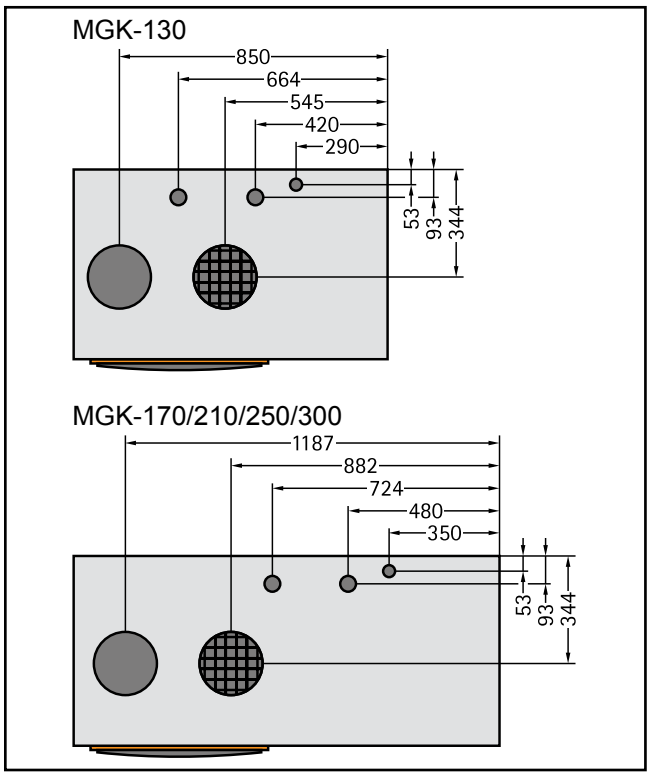


Fig.: Connection dimensions

Dismantling the casing

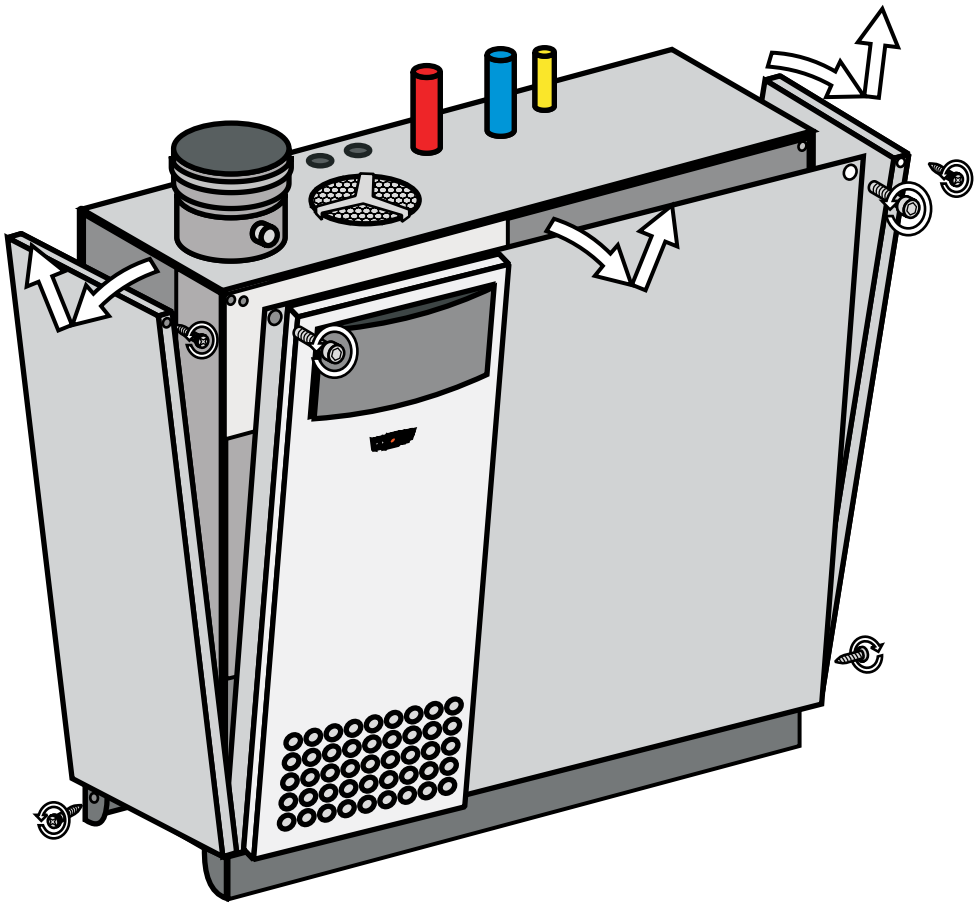


Fig.: Dismantling the front and side casing

Heating system flow and return are at the top of the boiler. For connections, see Fig. Always provide shut off valves for the flow and the return.
Install a check valve downstream of the heating circuit pump(s) to prevent incorrect circulation.
For new systems we recommend the installation of a blow-down tank (alternatively a dirt filter) into the return. For older systems this installation is compulsory.

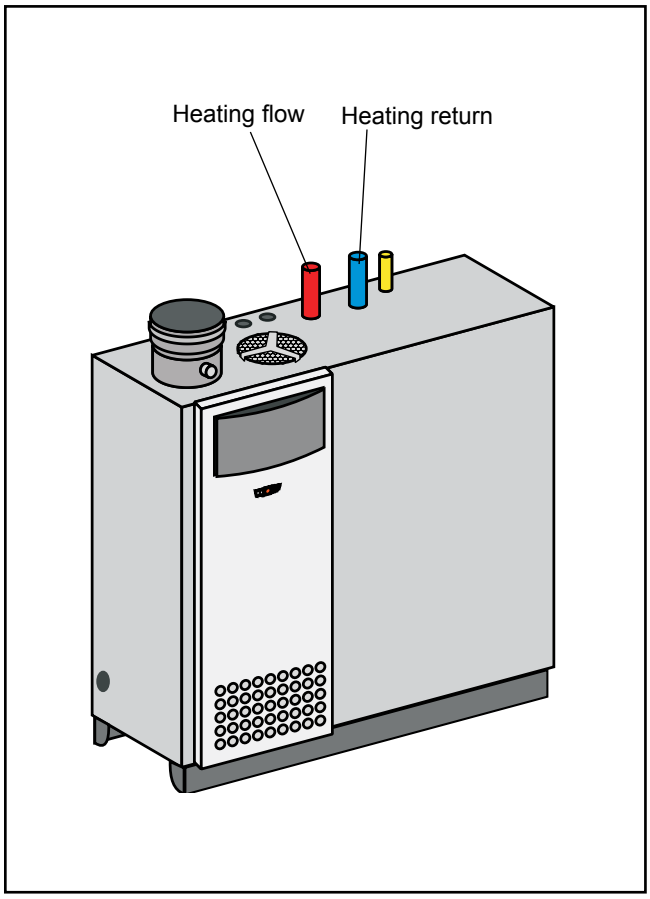


Fig.: Heating connections

Install a safety assembly comprising a safety valve with a response pressure of 6 bar, a pressure gauge and an automatic air vent valve. The line between the boiler and the safety valve must not be able to be shut off. Severely excessive boiler pressure due to excessive boiler water temperatures, can burst the boiler body or the boiler pipework, which would lead to a sudden escape of hot water **(risk of scalding)**.

Provide system separation by means of a heat exchanger, when using pipes which are not impermeable to oxygen.

NB

This boiler is only suitable for heating systems with pumped heating circuits. If no heating circuit pump has been installed, sufficient circulation through the radiators cannot be ensured, so that the room heating cannot be guaranteed.

The MGK is supplied without circulation pump. The pump rate of the pump to be installed on site must be determined subject to the system and boiler pressure drop. Switching via the MGK (see electrical connections).

Note:
Provide a drain & fill valve at the lowest system point.

Safety equipment
The minimum system pressure is 1.0 bar.
The gas condensing boilers are approved exclusively for sealed unvented systems up to 6 bar. The maximum flow temperature is factory-set to 85 °C and may be adjusted to 90 °C if required. Generally, the flow temperature is 80 °C for DHW operation.
There is no need for a minimum throughput at maximum flow temperatures below 85 °C.

Heating water

General requirements

There is a danger of damage to the wall-mounted boiler leading to the escape of water, poorer heat transmission or corrosion.

- The heating system is to be flushed through before the connection of the wall mounted gas condensing boiler in order to remove residues from the pipework such as welding sputter, hemp, putty, sludge deposits etc.
- Installation of a sieve/dirt trap in the return and regular maintenance of the sieve / dirt trap; see Wolf accessories (5 µm).
- The automatic vent of the appliance must be open during operation
- Potable water or saline-free potable water is to be used as filling and supplementary water. The hardness of the system water may not fall below 2 °dH. The system-specific filling and supplementary water qualities are to be taken from the section 'Water treatment planning notes'.
- A hydraulic separator must be provided for if the entry of oxygen cannot be excluded
- The pH value of the heating water must lie between 8.2 and 8.5
- In general, filling and supplementary water must be submitted to a desalization; softening via a single-stage ion exchanger is not permissible. The permissible methods and limit values are to be taken from the section entitled 'Water treatment planning notes' (ATTENTION: the limit values are plant-specific)
- Inhibitors and anti-freeze are not approved.
- A system logbook is to be maintained; see 'Water treatment planning notes'.

After proper filling of the system, the system must be heated to the maximum and the total hardness and pH value measured again and adjusted. These values must be checked again and adjusted after 6-8 weeks.

Additional requirements for operation <u>without</u> low-loss header

- Systems with only one MGK
- Sludge separator in the device return of the MGK
- Desalization of the heating water to 2 - 3 °dH
- Control of the calorifier charging only via the MM module (configurations 1 and 10)
- Calorifier charge pump at least DN 25 with a lifting height of at least 6 m
- The max. inlet temperature must be set to 75 °C with the parameter HG08

The water treatment planning notes must be observed, as otherwise damage to the system may occur leading to the escape of water.

The manufacturer cannot accept any liability for damage to the heat exchanger resulting from oxygen diffusion into the heating water. In the case that oxygen can penetrate into the system, we recommend a hydraulic separator by installing an intermediate heat exchanger.

Note from VDI 2035

Limescale formation can be influenced above all through the type and method of commissioning. Heat up the system at the lowest power with an even and sufficient flow rate. In the case of multi-boiler systems it is recommended to put all boilers into operation at the same time so that the total amount of lime cannot concentrate on the heat transfer surface of an individual boiler.

To submit pipework to a leak test:
Test pressure on hot water side max. 8 bar.
Before the test, close the shut-off valves in the heating circuit to the device, since otherwise the safety valve (accessory) will open at 3 bar.
The device has already been tested for leaks at 6 bar in the factory.
If there are leaks there is a danger of escape of water leading to damage to property.

With a specific system volume of >50 l/KW the total degree of hardness must be adjusted to 2-3 °dH using a desalting process.

Condensate connection

Fill the siphon with water prior to commissioning. Otherwise there is a risk of flue gas escaping.

When routing condensate into the public sewer system, observe local regulations. If condensate is directly routed to the public sewer, ensure ventilation, so that the public sewer cannot affect the condensing boiler.

NB Use only plastic for all condensate drain pipes.

Fig.: Siphon

Neutralising system (accessory)

The neutralising system can be connected directly to the appliance. Consumption approx. 10-30 g/kW p.a. Observe the associated instructions.

NB **Trim the connection hoses, so that**
- **the condensate can drain fully**
- **backup loops are prevented**
- **a perfect seal is ensured.**

Fig.: Neutralising system (accessory)

Condensate drain, single boiler systems

When installing the MGK as an individual appliance, fit a condensate drain (DN 160 - part no. 2651341, DN 200 - part no. 2651389).
The connections of the condensate source can be joined with the "Condensate hose set" (part no.8905844) and can be connected to the neutralising system.

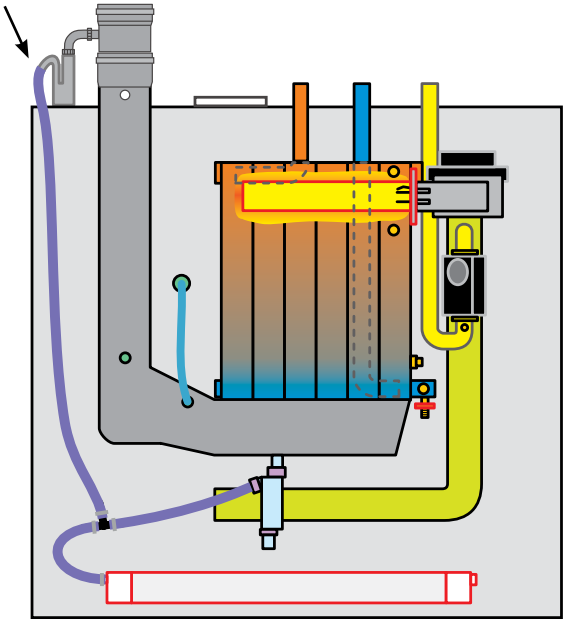


Fig.: Condensate hose

Condensate lifting system (accessory)

The Wolf condensate lifting system is fully wired and can be integrated into the MGK. The power supply and the alarm output of the condensate lifting system are connected to the boiler control unit.
6 m PVC hose for draining off the condensate is included.

Condensate lifting system (accessory)

**Connection of a Wolf cylinder,
solar cylinder SEM or third party cylinder**

We recommend the MM or KM controllers from the range of Wolf accessories for optimum switching of heating circuit and cylinder primary pumps.

When sizing the cylinder ensure that the lowest constant cylinder output corresponds at least to the lowest heat input from the boiler. A solar cylinder (without solar thermal system) can be connected to increase the constant DHW output. For this, both internal indirect coils need to receive a volume flow in series. Otherwise it cannot be assured that the cylinder will be fully heated up.

Gas connection

Routing the gas pipe as well as making the gas connections must only be carried out by a licensed gas fitter.

Remove all residues from the heating pipework and the gas line prior to connecting the condensing boiler, particularly in older systems.
Prior to commissioning, test all pipe and gas connections for leaks.
Inappropriate installation or using unsuitable components or assemblies may lead to gas escaping, which results in a risk of poisoning and explosion.

Install a gas ball valve with fire protection in the gas supply line upstream of the Wolf condensing boiler. Otherwise explosions may occur during a fire. Size the gas supply line in accordance with local regulations.

**Check the gas line for tightness without the boiler.
Never release the test pressure via the gas valve.**

**Gas fittings on the appliance may be pressure tested to 150 mbar. Higher pressure may damage the gas train, resulting in a risk of explosion, asphyxiation or poisoning.
Close the gas ball valve on the gas condensing boiler to pressure test the gas line.**

Mount the gas ball valve in an easily accessible place.

- Prior to installation, ensure that the boiler is set to the available gas type.

  **At the factory, the boiler is set up for natural gas H 15.0:
  Ws = 11.4 - 15.2 kWh/m³ = 40.9 - 54.7 MJ/m³**

  When changing the gas type, set the appliance in accordance with chapter "Changing the gas type/CO_2 settings".

- Only commission the appliance when the rated supply pressure has been reached.

NB **Only use original Wolf components or CE-designated flue systems to create flue lines. Observe the technical information regarding ventilation air supply / flue systems prior to installing the flue or the ventilation air connection.**

Different countries have different regulations. We would therefore recommend you contact the appropriate authorities including the local flue gas inspector, to check local requirements prior to the boiler installation.

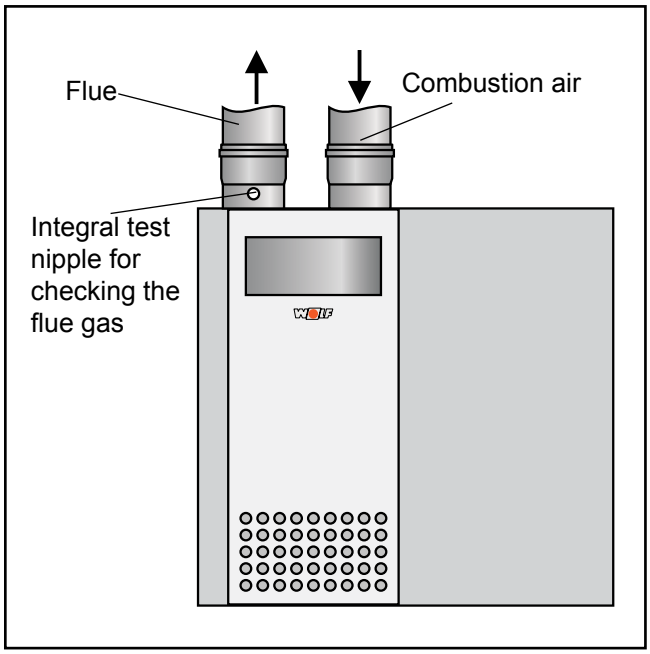


Fig.: Example: Ventilation air / flue system

With low outside temperatures, the water vapour contained in the flue gas may condense and form ice on the flue. Use on-site measures to prevent ice from falling, e.g. the installation of a snow catcher grille.

General information, electrical connection

The installation must be carried out by a licensed electrical contractor. Observe local electrical regulations and those of the local power supply utility.

Do not route sensor leads with 230 V mains cables.

The boiler power supply terminals are 'live' even when the ON/OFF switch has been switched OFF.

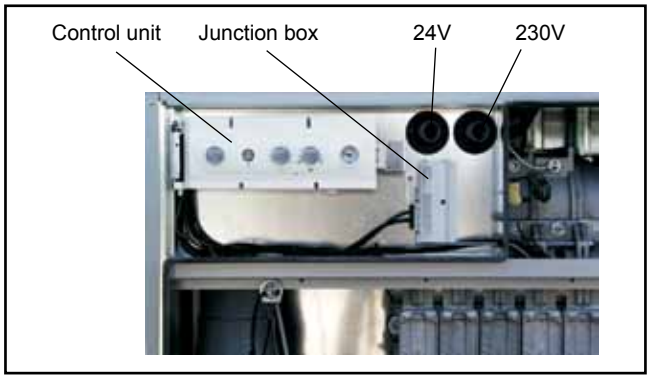


Fig.: Control unit MGK-170/210/250/300

NB:

The electrical installation may only be executed by an authorized company. VDE-standards and local regulations of the Energy Supply Company have to be adhered to.

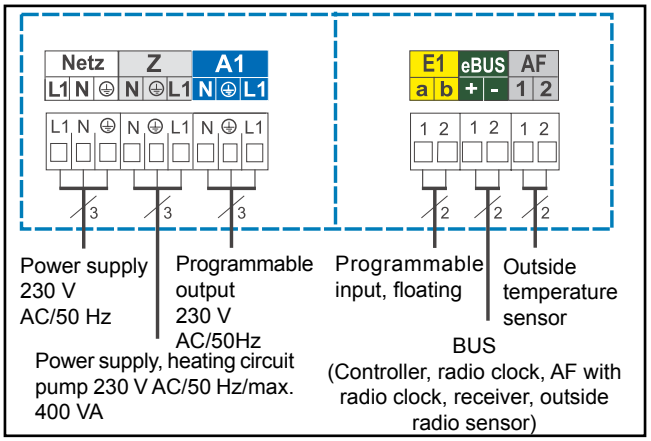
Terminal box

The control, regulating and safety equipment are fully wired and tested.
You only need to connect the power supply and the external accessories.

Power supply
Create a permanent connection for the power supply.

Provide the power supply via a main isolator (heating system emergency stop switch) that ensures at least 3 mm contact separation for all poles.

Power cable, flexible, 3 x 1.0 mm² or rigid, up to 3 x 1.5 mm².



Installation information, electrical connection, mains

- Isolate the system from the power supply before opening.
- Open the terminal box.
- Insert the strain relief into the holes provided.
- Strip approx. 70 mm insulation off the power cable.
- Push the cable through the strain relief and secure the strain relief.
- Pull off the Rast5 plug.
- Terminate the appropriate cores at the Rast5 plug. Leave the cores for the earth conductor gr/ye approx. 10 mm longer than those for L and N.
- Push the inserts back into the terminal box casing.
- Push the Rast5 plugs back into their correct positions.

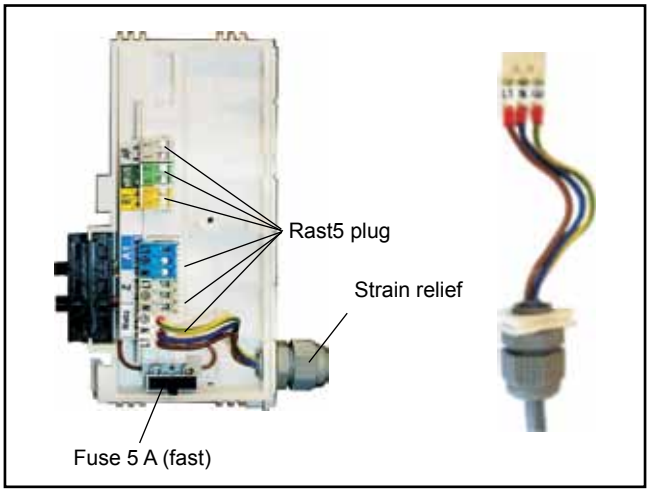


Fig.: Junction box

Changing a fuse

Isolate the gas condensing boiler from the power supply before changing a fuse. The ON/OFF switch on the boiler does not provide separation from the power supply.
Danger through 'live' electrical components. Never touch electrical components or contacts as long as the gas condensing boiler has not been isolated from the power supply. Risk to life.

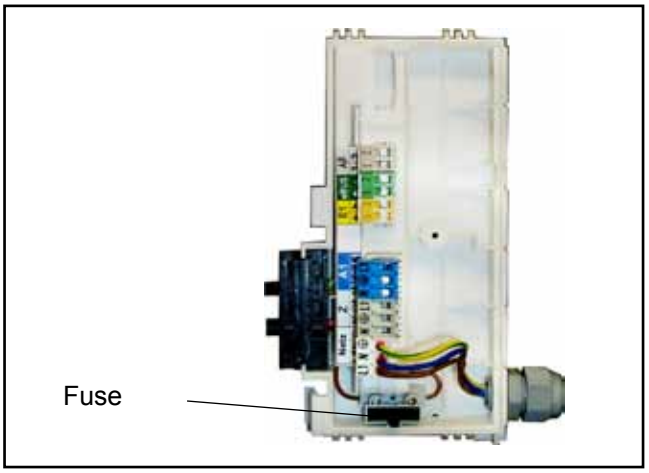


Fig.: Terminal box cover open

Heating circuit pump connection (230 V AC; max. 400 VA)

Insert the cable glands into the terminal box. Insert and secure the cable through the cable entry. Connect the heating circuit pump 230 V AC to terminals L1, N and ⏚.

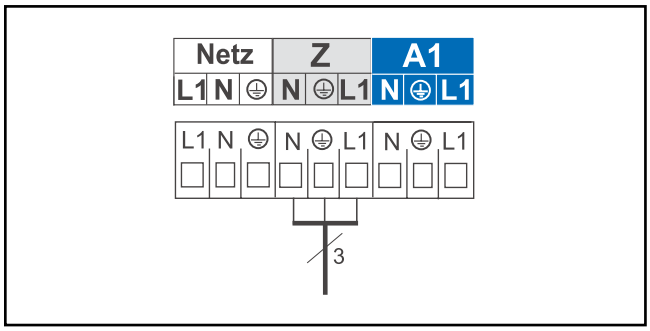
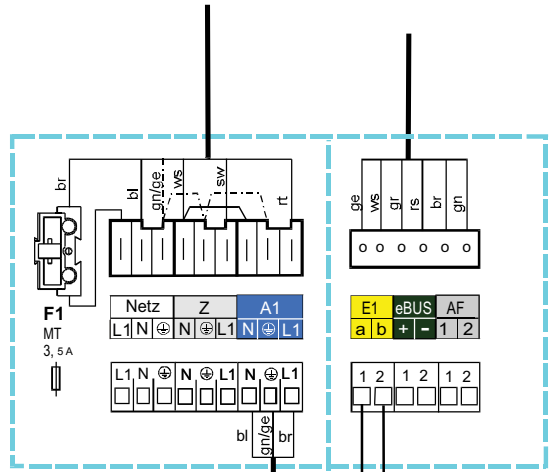


Fig.: Connection, heating circuit pump

Wiring diagram, ventilation air damper (not for MGK-130)



Terminal box MGK

24VDC

Supply air damper with servomotor

M
230V~

Power supply
230 V AC

Limit switch

Note:
The contractor parameter
HG13/GB13 (input 1) **must be set to 5**
(factory setting for supply air damper) and
HG14/GB14 (input 1) **must be set to 7**
(factory setting for supply air damper)

With the contact open, the burner remains blocked for DHW and central heating, even for emissions test and frost protection.

NB:
Limit switch for supply air damper must be floating!
Otherwise the MGK control unit will be destroyed.

Connection output A1 (230 V AC; 200 VA)
Insert the cable glands into the terminal box. Insert and secure the connecting cable through the cable gland. Terminate the connecting cable at terminals L1, N and ⏚. The parameters for output A1 are described in the table.

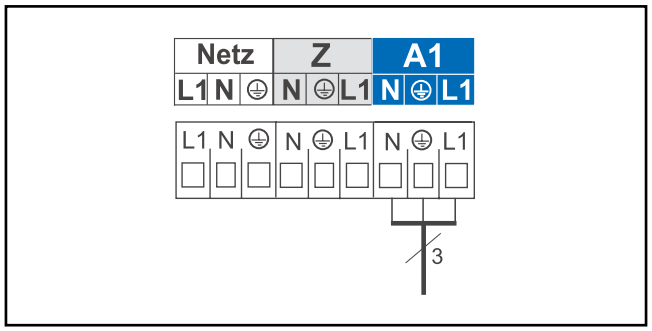
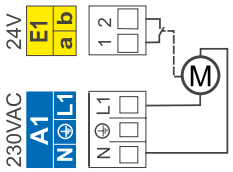


Fig.: Connection output A1

The functions of output A1 can be scanned and adjusted with eBUS-enabled Wolf control accessories. The following functions can be allocated to output A1:

Code	Explanation
0	**No function** Output A1 is not switched
1	**DHW circulation pump 100%** Output A1 is switched by control accessory (BM) if DHW circulation has been enabled. Output A1 is constantly activated when no accessory controller is installed.
2	**DHW circulation pump 50%** Output A1 is switched by control accessories (BM) in cycles if DHW circulation has been enabled. 5 minutes ON and 5 minutes OFF. Output A1 is constantly cycled in 5 minute intervals when no accessory controller is installed.
3	**DHW circulation pump 20%** Output A1 is switched by control accessories (BM) in cycles if DHW circulation has been enabled. 2 minutes ON and 8 minutes OFF. Output A1 cycles constantly when no accessory controller is installed.
4	**Alarm output** Output A1 is switched after a fault and after expiry of 4 minutes.
5	**Flame detector** Output A1 is switched after a flame has been detected.
6	**3-way valve** Output A1 is switched during cylinder heating.
7	**Ventilation damper** Output A1 is switched first prior to each burner start. The burner will, however, only be enabled after input E1 has been closed. ⚠ Important: In any case, input E1 must also be programmed as "Ventilation damper"  The feedback to input E1 must be made with a floating contact. Otherwise, use an on-site relay for potential separation.
8	**External ventilation** Output A1 is switched inverse to the gas combination valve. Switching OFF external ventilation (e.g. extractor fan) during burner operation is only required, if the boiler is operated as an open flue system.
9	**External gas valve** Output A1 is switched in parallel to the gas combination valve.

Connection input E1 (24 V)
Connect the connecting cable for input 1 at terminals E1 in accordance with the wiring diagram; first remove the jumper between a and b from the respective terminals.

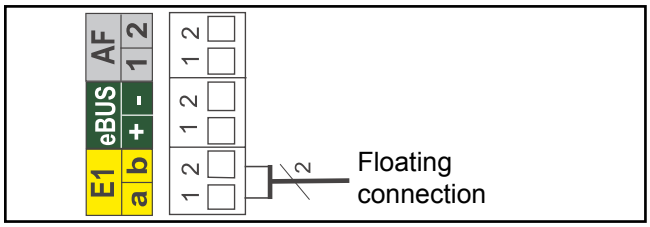


Fig.: Connection, room thermostat

The functions of input E1 can be scanned and adjusted with eBUS-enabled Wolf control accessories. The following functions can be allocated to input E1:

Code	Explanation
0	**Without function** Input E1 is not taken into consideration by the control unit.
1	**Room thermostat** With open input E1, heating operation will be blocked (summer mode), independently of any digital Wolf control accessories.
2	**Maximum thermostat / system pressure switch** A closed contact is a prerequisite for enabling the burner in heating and DHW mode. When the contact is opened, the appliance switches the burner off and the pump run-on starts.
3	**Not allocated**
4	**Flow switch** Optional connection for an additional water flow switch. Input E1 must be closed within 12 seconds after the pump has been switched. Where this is not the case, the burner will be switched OFF, and fault 41 will be displayed.
5	**Monitoring, ventilation air damper (factory setting E1)** See parameters of output A1, no. 7 ventilation damper.
8	**Burner disablement (operation without burner)** Operation without burner Closed contact, burner lockout Heating circuit pump and calorifier charge pump run in normal mode The burner is enabled in chimney sweep mode and for frost protection Opened contact enables the burner again

Connection, digital Wolf control accessories
Only connect control units from the Wolf accessory range. Each accessory is supplied with its own connection diagram.
Use a two-core cable (cross-section > 0.5 mm²) as the connecting cable between the control unit accessory and the condensing boiler.

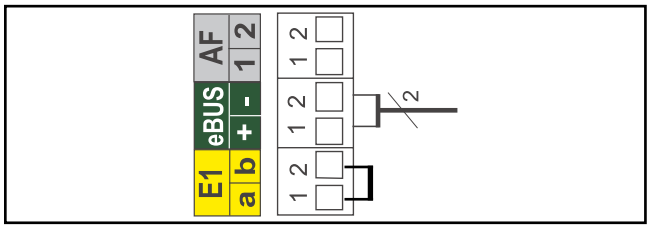


Fig.: Digital Wolf control accessories connection (eBUS interface)

Connection, outside temperature sensor
The outside temperature sensor for digital control accessories may be connected to the terminal strip of the AF boiler connection, or the terminal strip of the control accessories.

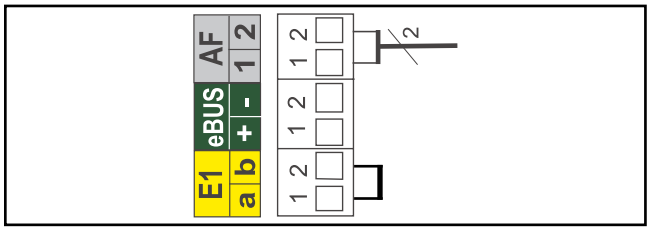


Fig.: Connection, outside temperature sensor

Filling the system / filling the siphon

Fill the system and vent it correctly in line with the details in the chapter "Water treatment" to ensure the perfect function of the condensing boiler (see page 30).

NB Before connecting the gas condensing boiler, flush the heating system to remove residues such as welding pearls, hemp, putty, etc. from the pipework.

- The gas tap must be shut.
- Open the air vent valves.
- Open all heating circuits.
- Open all radiator or mixer valves.
- Slowly fill the entire heating system and boiler when cold, for example via the BDF valve at the return, to approx. 2 bar pressure.

NB **Inhibitors are not permissible.**

- Open the flow valves on the condensing boiler.
- Fill the heating system to 2 bar pressure. In operation, the pressure gauge must indicate between 1.5 and 5.5 bar.
- Check the entire system for water leaks.
- Remove the siphon.
- Fill the siphon with water.
- Refit the siphon.
- Start the condensing boiler, set the heating water selector to position "2" (pump running, illuminated status indicator ring constantly green).
- Vent the heating circuit; for this, switch the gas condensing boiler ON and OFF again several times.
- Top up with water when the system pressure falls substantially.
- Open the gas ball valve.
- Press the reset button.

Note: In constant mode, the heating circuit is automatically vented via the air vent valve (accessory).

NB The condensate hose attached to the siphon must not form a loop or roll up, otherwise the operation might be impaired.

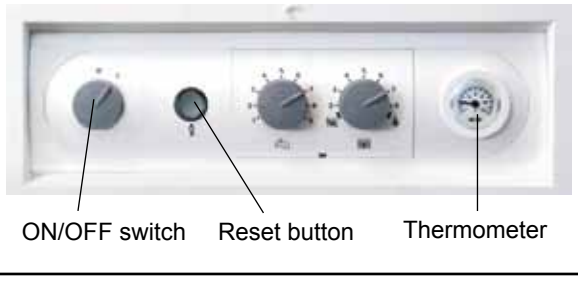


Fig.: Control unit overview

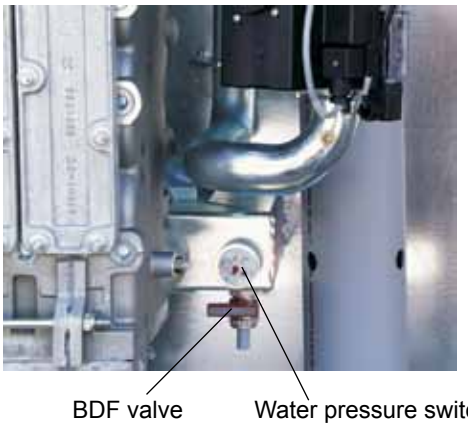


Fig.: BDF valve

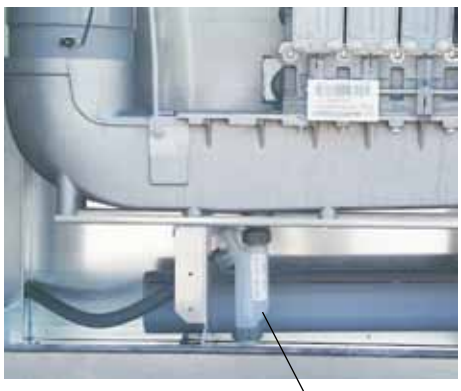


Fig.: Siphon

Checking the gas supply pressure
(Gas flow pressure)

Work on gas components must only be performed by a licensed gas fitter. Work which is carried out incorrectly may lead to gas escaping, resulting in a risk of explosion, asphyxiation or poisoning.

- Set the ON/OFF switch to "0".
- Open the gas shut-off valve.
- Release the plug at test nipple ① and vent the gas supply line.
- Connect the differential pressure tester at test nipple ① to "+", with "-" against atmosphere.
- Switch ON the ON/OFF switch.
- After starting the boiler, check the supply pressure at the differential pressure tester.

NB

Natural gas:
If the supply pressure (flow pressure) lies outside the 18 to 25 mbar range, adjustments must not be carried out and the boiler must not be taken into use.

- Switch OFF the ON/OFF switch. Close the gas shut-off valve.
- Remove the differential pressure tester and **re-seal the test nipple with plug** ①.
- Open the gas shut-off valve.
- Check the test nipple is gas-tight.
- Close the boiler again.
- Check and if necessary amend the type plate regarding the gas type.

If any screws are not tightened, there is a danger of gas escaping, leading to a risk of explosion, asphyxiation or poisoning.

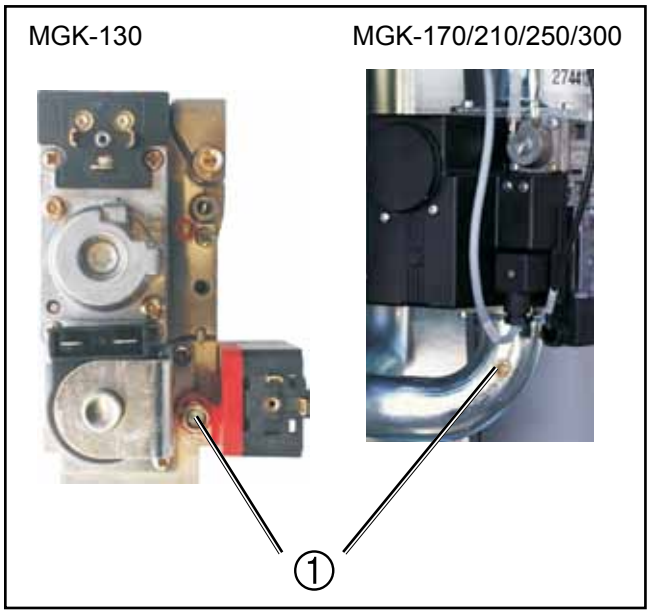


Fig.: Test nipple for checking the gas supply pressure

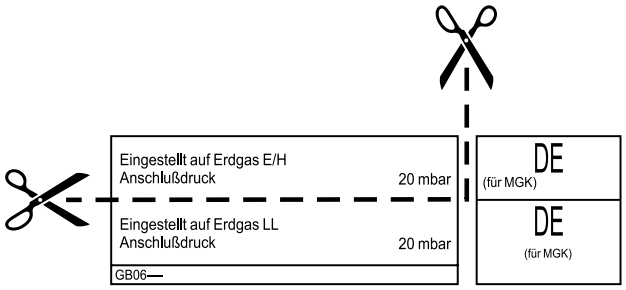


Fig.: Conversion type plate MGK

Fig.: Type plate MGK

Only qualified personnel must carry out the commissioning and operation of the boiler, as well as instruct the user.

- **Check that the power supply has been switched OFF.**
- **Check the boiler and system for leaks.**

  Prevent water leaks.
- Check location and seating of fitted components.
- Check all connections and component links for leaks.

If tightness cannot be ensured then there is a risk of water damage.

- Check that all flue gas accessories have been correctly installed.
- Open the shut-off valves in flow and return.
- Open the gas shut-off valve.
- Switch the power supply 'live'.
- Switch ON the system ON/OFF switch on the control unit.
- Check the ignition and the regular flame structure of the burner.
- If the system water pressure falls below 1.5 bar, top up with water until a pressure of 2.0 to max. 5.5 bar has been achieved.
- The illuminated ring shows a green colour, if the boiler starts correctly.
- Check the condensate drain.
- Familiarise the customer with the operation of the boiler using the operation and/or assembly instructions and point out any necessary treatment of filling and supplementary water
- Complete the commissioning report and hand over the instructions to the customer.

Saving energy

- **Instruct the customer about energy saving options.**
- **Refer your customer to section "Information for energy efficient operation" in the operating instructions.**

Fig.: Control unit overview

Setting the BUS address for multiple heating appliances

When operating several heating appliances, set the BUS address in conjunction with a KM control unit in accordance with the table.

Hold down the reset button; after 5 seconds, the corresponding flashing code will be displayed (see table). Select the corresponding address with the "DHW temperature rotary selector"; then release the reset button again.

BUS address	Rotary selector position DHW	Illuminated ring indication
1	1	flashing red
2	2	flashing yellow
3	3	flashing yellow/red
4	4	flashing yellow/green
5	5	flashing green/red
0	6	flashing green (factory setting)

NB **Modifications must only be carried out by a recognised heating contractor or by Wolf customer service.**

NB **Incorrect operation can lead to system faults.**
When selecting parameter GB 05 (frost protection, outside temperature) note that frost protection is no longer ensured at temperatures below 0 °C. This can lead to heating system damage.

⚠ **To prevent damage to the heating system, cancel night setback when outside temperatures fall below −12 °C. If this rule is not observed, ice may build up on the flue outlet which may cause injury or material losses.**

You can check the output data for the boiler on the type plate.

The control parameters can be modified or displayed via control accessories with eBUS capability. For procedures, check the operating instructions of the relevant accessories.

Parameter			Setting range	Factory setting	Ind. setting
Column 1	Column 2				
GB01	HG01	Flow temperature hysteresis	5 to 30 K	8 K	
	HG02	Lower fan speed	20 to 100%	20%	
	HG03	Higher fan speed, DHW	20 to 100%	100%	
GB04	HG04	Higher fan speed, central heating	20 to 100%	100%	
GB05	A09	Frost protection limit	-10 to +10 °C	+2 °C	
		With connected outside temperature sensor and insufficient temperature, pump ON			
GB06	HG06	Pump operating mode	0 to 1	0	
		0 → Pump ON in winter mode 1 → Pump ON with burner operation			
GB07	HG07	Boiler circuit pumps run-on time	1 to 30 min	1 min	
GB08 or	HG08 HG22	Maximum limit, boiler circuit TV-max applies to heating mode	40 to 90 °C	85 °C	
GB09	HG09	Burner cycle block	1 to 30 min	7 min	
		Applies to heating mode			
	HG10	eBUS address (display only)	0 to 5	0	
		Heat source BUS address			
GB13	HG13	Programmable input E1	0 to 5	5	
		Various functions can be assigned to input E1 (See chapter "Connection input E1")			
GB14	HG14	Programmable output A1	0 to 15	7	
		Various functions can be assigned to output A1 (See chapter "Connection output A1")			
GB15	HG15	Cylinder hysteresis	1 to 30 K	5 K	
		Switching differential for cylinder re-heating			
	HG21	Minimum boiler temperature TK-min	20 to 90°C	20°C	

Column 1: Control accessories ART, DWT, DWTM, DWTK
Column 2: Control accessories WRS (Wolf control system)

Limiting the maximum output

MGK-130 / MGK-170 / MGK-210 / MGK-250 / MGK-300
Output setting (parameter GB04)

The output setting can be modified with Wolf control accessories with eBUS capability.
The heating output will be determined by the gas fan speed. By reducing the gas fan speed in accordance with the table, the maximum output will be matched at 80/60 °C to natural gas H.

MGK-130														
Output (kW)	23	31	38	46	53	61	68	76	83	91	99	106	114	121
Display value (%)	20	25	29	34	38	43	47	52	56	61	65	70	75	100

MGK-170														
Output (kW)	27	40	50	60	70	80	90	100	110	120	130	140	150	160
Display value (%)	20	28	34	40	46	52	58	64	70	76	82	88	94	100

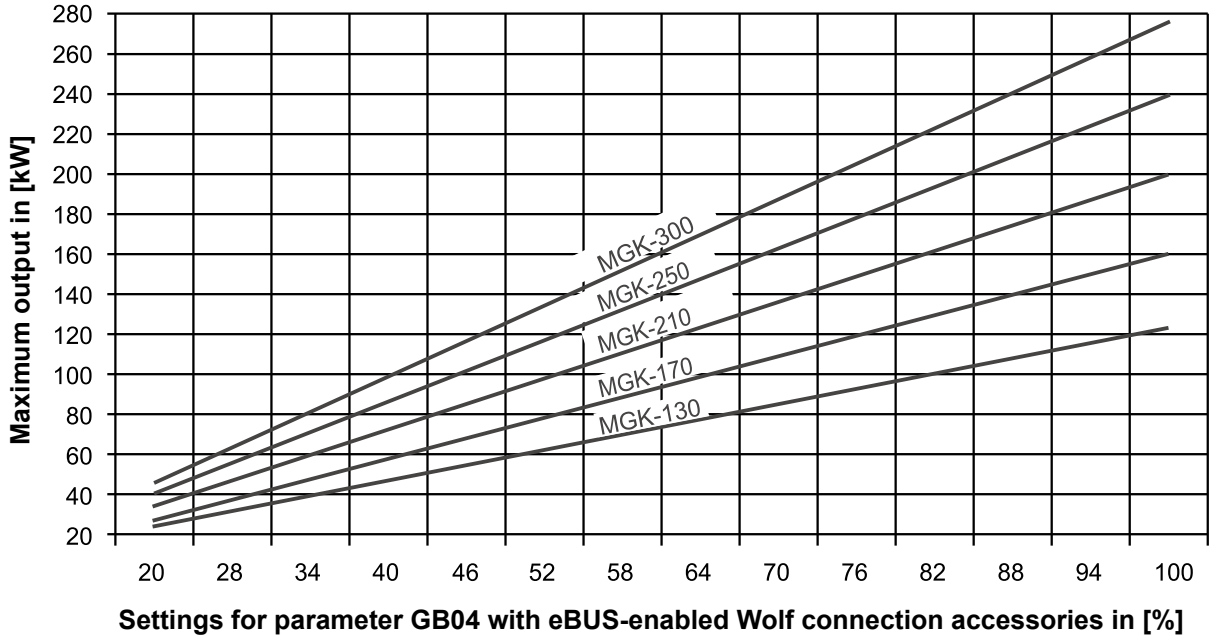
MGK 210														
Output (kW)		34	40	55	70	85	100	115	130	145	160	175	190	200
Display value (%)		20	23	30	37	45	52	59	66	73	81	88	95	100

MGK 250														
Output (kW)	40	55	70	85	100	115	130	145	160	175	190	205	220	240
Display value (%)	20	26	32	38	44	50	56	62	68	74	80	86	92	100

MGK-300														
Output (kW)	45	62	79	97	114	131	148	165	182	200	217	234	251	275
Display value (%)	20	27	34	41	47	54	61	68	75	82	89	96	102	100

Table: Output setting

Limiting the maximum output relative to a flow/return temperature of 80/60 °C



Changing the gas type / CO_2 settings

Adjusting the gas / air connection

NB **Carry out the adjustments in the following sequence: At the factory, the gas combination valve has been set up for natural gas E (G20). Only adjust the gas combination valve after the system has been changed to a different gas type.**

Converting the MGK-130 to LPG P
A separate conversion kit with gas restrictor, gas combination valve and boiler coding card is required for this conversion. Observe the information in the conversion instructions supplied.

Conversion MGK-170/210/250/300 to P
A separate conversion kit with boiler coding card is required for this conversion. Observe the information in the conversion instructions supplied.

Conversion kits MGK LPG	
Type	Part no. conversion kit
MGK-130	87 51 351
MGK-170 and MGK-250	87 51 293
MGK-210	87 51 295
MGK-300	87 51 298

Overview boiler coding cards MGK		
Type	Part no. boiler coding card for natural gas H	Part no. boiler coding card for LPG P
MGK-130	27 44 358	27 44 356
MGK-170	27 44 238	27 44 354
MGK-210	27 44 237	27 44 355
MGK-250	27 44 170	27 44 354
MGK-300	27 44 359	27 44 357

A standard adjustment at the GCV is always required for a change of gas type to be effective.

Make the standard settings at the gas combination valve in accordance with the table. Otherwise there is a risk of damage to the appliance.

Carefully turn the screw fully home and then undo as follows:
Standard setting for different gas types: Turn anti-clockwise

Natural gas H		
Type	Zero point adjusting screw	
MGK-130	1 ¾ turns	Gas restrictor 1000

Natural gas H		
Type	Zero point adjusting screw	Throughput adjusting screw
MGK-170	2 turns	1 ½ turns
MGK-210	1 ½ turns	1 ¾ turns
MGK-250	1 ½ turns	1 ¾ turns
MGK-300	1 ¾ turns	2 turns

For other standard settings relating to the gas type, see the conversion instructions.

Changing the gas type / CO_2 settings

A) CO_2 setting at the upper load (emissions test mode)

- Undo the four screws from the front casing and remove the casing.
- Remove the screw from the "flue gas" test port.
- Insert the test probe of the CO_2 test instrument into the "flue gas" test port.
- Turn the temperature selector to "Emissions test" .
  (Illuminated status indicator ring flashes yellow.)
- Check the CO_2 content at full load, and compare the actual values with those in the table below.
- Correct the CO_2 setting as required using the **gas throughput adjusting screw** on the gas combination valve in accordance with the table.

- **Turn clockwise - lowers CO_2 content**
- **Turn anti-clockwise - raises CO_2 content**

Appliance open (without casing) at **upper** load
Natural gas H 9.2% ± 0.2%

- Terminate the emissions test mode by returning the temperature selector to its original position.

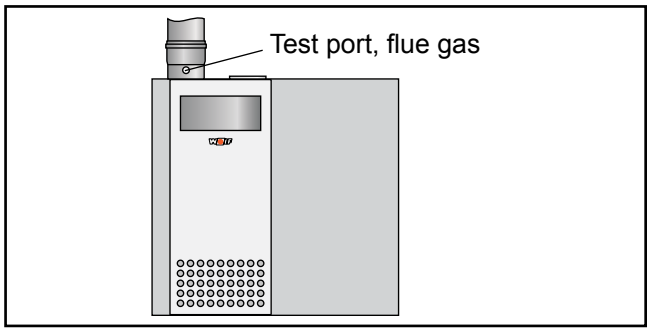
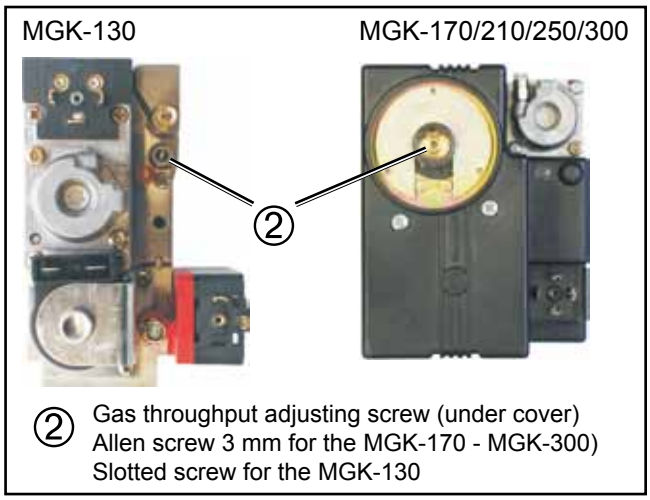


Fig.: Flue gas test at the integral test port



② Gas throughput adjusting screw (under cover)
Allen screw 3 mm for the MGK-170 - MGK-300)
Slotted screw for the MGK-130

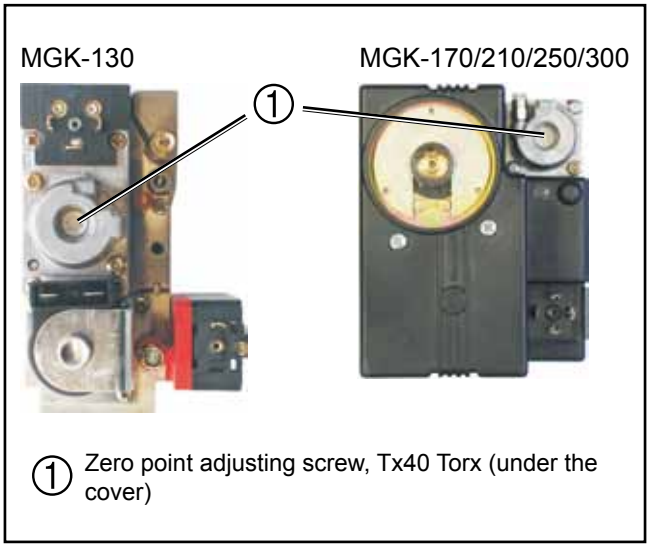
Fig.: Gas combination valve

B) CO_2 adjustment at the lower load (soft start)

- Restart the gas condensing boiler by pressing the "Reset button".
- Check and if necessary correct the CO_2 content approx. 30 s after burner start using the CO_2 tester, by fine adjusting the **zero point adjusting screw** in accordance with the table. Make this adjustment within 120 s of the burner start. If necessary, repeat the start phase for setting procedures by pressing the reset button.

- **Turn clockwise - raises CO_2 content**
- **Turn anti-clockwise - lowers CO_2 content**

Appliance open (without casing) at **lower** load
Natural gas H 9.0% ± 0.2%



① Zero point adjusting screw, Tx40 Torx (under the cover)

Fig.: Gas combination valve

C) Checking the CO_2 setting

- After completing the work, refit the casing cover and check the CO_2 value with the appliance closed.

⚠ Observe the CO emissions whilst making CO_2 adjustments.
The gas combination valve is incorrectly adjusted, if the CO value is >200 ppm, when the CO_2 value is correct.

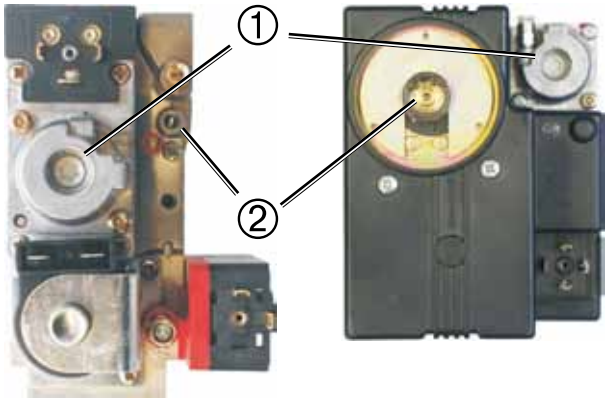
Take the following steps:

- Repeat the adjusting process from section A.
- The condensing boiler is correctly adjusted when the CO_2 values correspond to those in the table below.

Appliance closed (without casing) at **upper** load
Natural gas H 9.3% ± 0.3%

Appliance closed (with casing) at **lower** load
Natural gas H 9.1% ± 0.3%

MGK-130 MGK-170/210/250/300



① Zero point adjusting screw, Tx40 Torx (under the cover)

② Gas throughput adjusting screw (under cover)
Allen screw 3 mm for the MGK-170 - MGK-300)
Slotted screw for the MGK-130

Fig.: Gas combination valve

D) Completing the adjustments

- Shut down the boiler and close the test ports and hose nipples; check for tightness.

Testing the combustion parameters

Test the combustion parameters with the boiler closed!

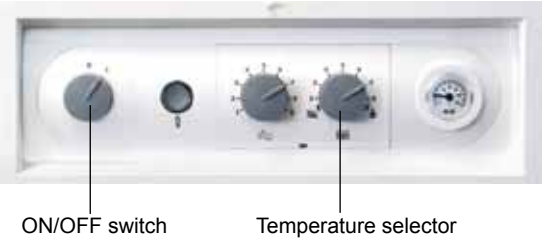
Testing the combustion air

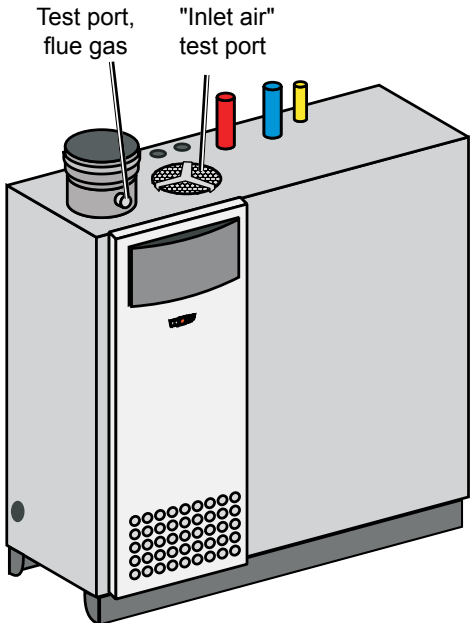
- Hold the test probe into the combustion air supply and calibrate the tester or
- for balanced flue operation, insert the test probe into the ventilation air adaptor.

  Start the gas condensing boiler and turn the heating water temperature selector to the emissions test symbol.

  (The status display ring flashes yellow.)

  - Check the temperature and enter it in the commissioning report.
  - After the test has been completed, switch the boiler OFF, remove the test probe and close the test port. Ensure the screws are seated firmly.
  - Return the temperature selector into its original position.





Testing the flue gas parameters

Flue gas can escape into the installation room, if the test port is left open. This results in a risk of asphyxiation.

- Remove the screw from the "flue gas test port".
- Start the gas condensing boiler and turn the temperature selector to the emissions test symbol [chimney sweep].
  (The indicator ring flashes yellow.)
- Insert the test probe.
- Read off flue gas values and enter them in the commissioning report.
- After the test has been completed, remove the test probe and close the test port again. Ensure the screws are seated firmly.
- Return the temperature selector into its original position.

Commissioning report

Commissioning steps	Test value or confirmation
1.) Gas type	Natural gas H ☐ LPG ☐ Wobbe index _____ kWh/m³ Calorific value, heating _____ kWh/m³
2.) Gas supply pressure checked?	☐
3.) Gas leak test carried out?	☐
4.) Balanced flue system checked?	☐
5.) Water connections checked for leaks?	☐
6.) Siphon filled?	☐
7.) System flushed?	☐
8.) System filled and water treatment carried out according to 'Water treatment planning notes'? pH value adjusted Total degree of hardness adjusted	☐ _____ pH value _____ °dH
9.) Has the system been filled in acc. with the technical information regarding water treatment?	☐
10.) Boiler and system vented?	☐
11.) System pressure 1.5 - 2.5 bar?	☐
12.) Entered gas type and output onto label?	☐
13.) Function test carried out?	☐
14.) Flue gas test Gross flue gas temperature Inlet air temperature Net flue gas temperature Carbon dioxide content (CO_2) or oxygen content (O_2) Carbon monoxide content (CO)	 _____ t_A [°C] _____ t_A [°C] _____ (t_A - t_L) [°C] _____ % _____ ppm
15.) Casing fitted?	☐
16.) System user trained, documentation handed over?	☐
17.) Confirm commissioning?	_____ ☐

Before commissioning, the system must be thoroughly cleaned / flushed through and a sludge filter (5 µm), e.g. Wolf accessories, installed in the return and in direct proximity to the boiler.
The filling and supplementary water may be treated only by means of a desalting procedure. The necessary degree of water treatment can be taken from the table 'Maximum permissible total hardness'.
The total degree of hardness of the system water may not fall below 2 °dH; this corresponds to a conductance of ≈ 60 µS/cm. The max. permissible total degree of hardness and the corresponding max. conductance are system-specific and must be calculated (see also the table 'Maximum permissible total hardness'). To this end the saline-free water (conductance <= 30 µS/cm) must be mixed with untreated potable water.
The addition of chemical agents as well as lime elimination via single-stage ion exchangers is not permissible, since otherwise device damage can occur leading to the escape of water.
We recommend regular emptying of the sludge filter and the maintenance of a system logbook.

Permissible methods:
- Deionisation via mixed-bed cartridges. These are multi-stage ion exchangers. We recommend cartridges from the Grünbeck or Judo companies for the initial filling and later if required.
- Deionisation by reverse osmosis
- Topping up with distilled water

Treatment of the heating water based on VDI 2035:
We recommend a pH value of between 8.2 and 8.5 for the heating water also in the case of combined installations of different materials.
A water analysis must be requested from the water supply company. This must be used to check whether the total hardness is low enough.
With a specific system volume $V_{sys,specific}$ >= 10 l/KW the next smaller value from the following table must be applied, with $V_{sys,specific}$ >= 20 l/KW the next-but-one smaller value and with $V_{sys,specific}$ >= 40 l/KW the smallest value.
With a specific system volume of >50 l/KW the total degree of hardness must be adjusted to 2-3 °dH using a desalting process. This corresponds to a conductance of 60 - 100 µS/cm.
If the boiler is integrated into the system without a low-loss header, the total hardness must be adjusted to 2 - 3 °dH (conductance = 60 - 100 µS/cm).

Limit values in relation to the specific system volume V_A (V_A = system volume / smallest individual power)
Conversion of total hardness: 1 mol/m³ = 5.6 °dH

	Total heating power	V_{sys} ≤ 10 l/kW			V_{sys} > 10 l/kW and < 40 l/kW			V_{sys} ≥ 40 l/kW		
		Total hardness / total alkaline earths		Conduct-ance	Total hardness / total alkaline earths		Conduct-ance	Total hardness / total alkaline earths		Conduct-ance
	[kW]	[°dH]	[mol/m³]	LF [µS/cm]	[°dH]	[mol/m³]	LF [µS/cm]	[°dH]	[mol/m³]	LF [µS/cm]
1*	< 50	2 - 16,8*	0,36 - 3,0*	60 - 500	2 - 11,2	0,36 - 2,0	60 - 300	2 - 3	0,36 - 0,54	60 -100
2	50-200	2 - 11,2	0,36 - 2,0	60 - 300	2 - 8,4	0,36 - 1,5	60 - 200	2 - 3	0,36 - 0,54	60 -100
3	200-600	2 - 8,4	0,36 - 1,5	60 - 200	2 - 3	0,36 - 0,54	60 -100	2 - 3	0,36 - 0,54	60 -100
4	>600	2 - 3	0,36 - 0,54	60 -100	2 - 3	0,36 - 0,54	60 -100	2 - 3	0,36 - 0,54	60 -100

*) for circulating water heaters (<0.3 l/KW) and systems with electrical heating elements

Gradual tightening of the specifications due to the specific system volume
(V_{sys} = system volume / lowest individual power setting) and the total heating power

The total filling quantity of water over the lifetime of the appliance may not exceed three times the nominal volume of the heating system.

Warning: the total hardness may not fall below 2 °dH

Example:

System with a 170 KW boiler;

System volume V_{system}= 4000 l

$V_{sys, specific}$ = 4000 l / 170 KW = 23.5 l/KW

This is larger than 10 l/KW, hence stage 3 must be selected instead of stage 2. The filling and supplementary water must lie within the range of **2 to 8.4 °dH** If the total hardness of the untreated potable water is too high, part of the filling and supplementary water must be desalted:

A % saline-free water must be added:

$A = 100\% - (C_{max} - 0{,}1\ °dH) / (C_{pot.\ water} - 0.1\ °dH) \times 100\%$

C_{max}	Maximum permissible total hardness in °dH
$C_{pot.\ water}$	Total hardness of the untreated potable water in °dH

We recommend that you include the supplementary water expected for the initial filling in the calculation. Untreated potable water can then be used for topping up later.

$$V_{treated} = A \times (V_{system} + V_{supplement})$$

In the case of large systems in stage 4 the supplementary water may not be included in the calculation for the initial filling.

$$V_{treated} = A \times (V_{system})$$

Example:

System power = 170 KW;

System volume V_{system} = 4000 l;
Volume of the supplementary water $V_{supplement}$ = 1000 l

Total hardness of the potable water $C_{pot.\ water}$ = 18.5 °dH;

Maximum permissible total hardness C_{max} = 8.4°dH

System power = 170 KW;
System volume V_{system} = 4,000 l;
Volume of the supplementary water $V_{supplement}$ = 1,000 l

$V_{sys, specific}$ = 4000 l / 170 KW = 23.53 l/KW

Total hardness of the potable water $C_{pot.\ water}$ = 18.5 °dH;

Maximum permissible total hardness C_{max} = 8.4°dH

Proportion of the filling water to be treated:
A = 100% - (8.4 - 0.1) / (18.5 - 0.1) x 100% = 54.9%

54.9% of the filling and supplementary water must be desalted.

$V_{treated}$ = 54.9% x (4,000 l + 1,000 l) = 2,746 l

When filling the system, 2,745 l deionised water must be filled. Subsequently, the system can be topped up to Vmax with potable water.

When topping up it must be checked regularly that the maximum permissible total hardness is not exceeded.

Planning				
Location				
Boiler output	Q_{K1}		kW	
	Q_{K2}		kW	
	Q_{K3}		kW	
	Q_{K4}		kW	
Lowest boiler output	Q_{Bmin}		kW	Lowest boiler output for the system
System output	$Q_{B,tot}$		kW	$Q_{B,tot} = Q_{B1} + Q_{B2} + Q_{B3} + Q_{B4}$
System volume	V_{system}		l	
Maximum expected top-up water volume	V_{top-up}		l	Total volume expected during the system service life
Volume of fill and top-up water	V_{max}		l	$V_{max} = V_{system} + V_{top-up}$
Total hardness of the DHW	C_{DHW}		°dH	e.g. from an analysis of the water supply
Checking the specific system volume	$V_{A, specific}$		l/kW	$V_{A, specific} = V_{system} / Q_{Kminimum}$ greater / less than 20 l/kW
Permissible total hardness	C_{max}		°dH	Maximum permissible total hardness according to the table
Proportion of desalinated DHW	A		%	$A = 100\% – [(C_{max} – 0.1\ °dH) / (C_{DHW} – 0.1\ °dH)] \times 100\%$
Fill water to be treated	$V_{treatment}$		l	$V_{treatment} = A \times V_{max}$ or $V_{treatment} = A \times V_{system\ at\ stage\ 4}$

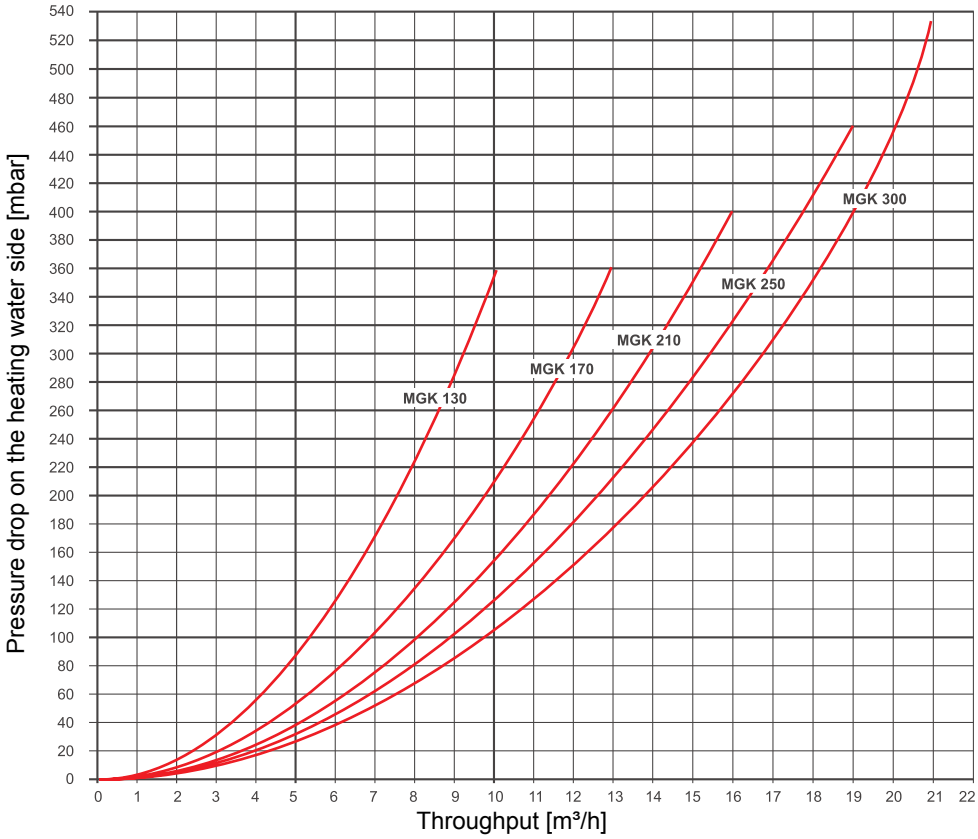
Commissioning: Fill and top-up water volumes							
Commissioning by							
Meter reading before first fill Z_{old} in l							
Date	Explanation	Abbreviation	Meter reading Z_{new} in l	Water volume V = Z_{new} - Z_{old} in l	Total hardness in °dH	pH value of system water after heating process and sufficient flushing	Signature
	Softened fill water	$V_{treatment}$			0,1		
	Untreated fill water	$V_{untreated}$					
	Top-up water	$V_{top-up,1}$					
	Top-up water	$V_{top-up,2}$					
	Top-up water	$V_{top-up,3}$					
	Top-up water	$V_{top-up,4}$					
	Top-up water	$V_{top-up,5}$					
	Top-up water	$V_{top-up,6}$					
	Top-up water	$V_{top-up,7}$					
	Top-up water	$V_{top-up,8}$					
	Top-up water	$V_{top-up,9}$					
	Top-up water	$V_{top-up,10}$					

Check:

Water volume V > **V_{max} ?** ☐ **Yes** ☐ **No**

If the water volume V is greater than **V_{max}**, top up with desalinated water.

Heating water pressure drop



Max. spread

A **cast section protection function** is integrated in the MGK. This prevents stresses in the material by limiting the maximum temperature differential between the flow and return. As of 28 K, the output is reduced. If 38 K is nevertheless reached, the burner shuts down briefly without a fault message. This characteristic must be taken into account when selecting the components (e.g. pumps, heat exchanger and cylinder).

Max. flow rate

Excessive flow velocities may lead to erosion.

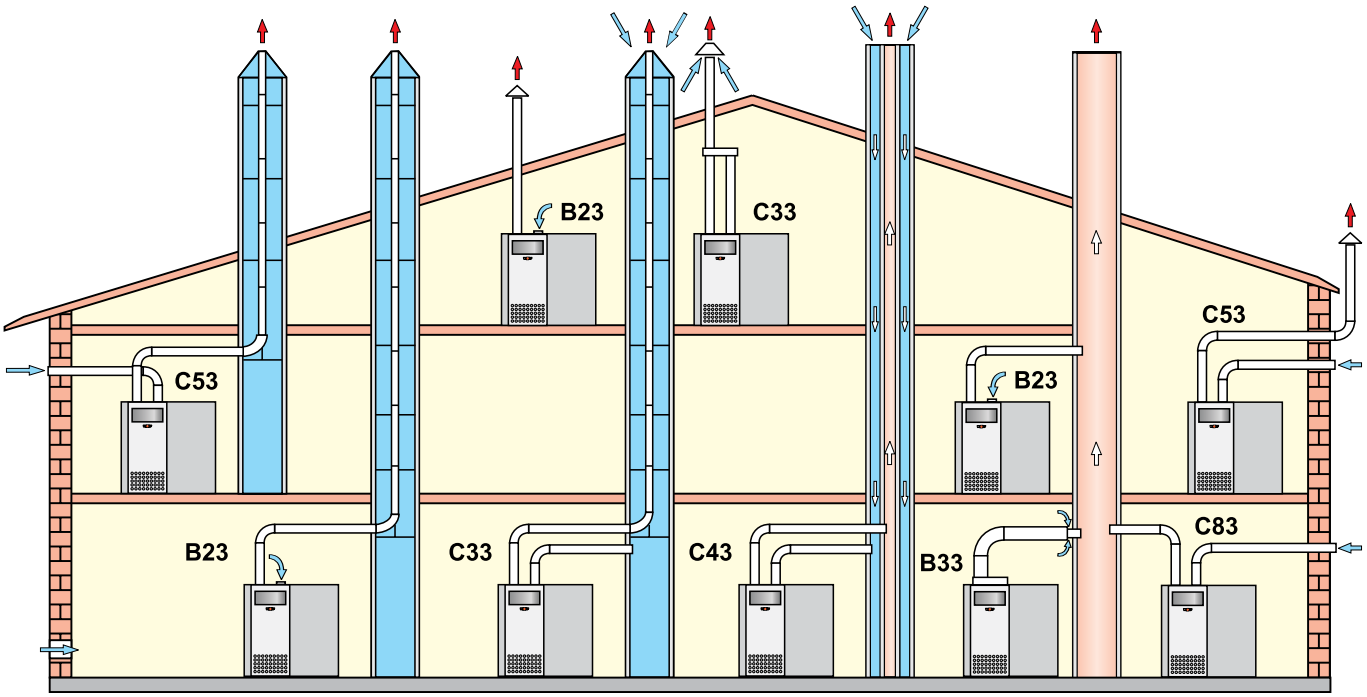
Maximum flow rate at Q_{max} :	MGK-130	9.4 m³/h
	MGK-170	13.6 m³/h
	MGK-210	16.4 m³/h
	MGK-250	19.1 m³/h
	MGK-300	21.9 m³/h

Pump sizing MGK 130/170/210/250/300

The following 230V pumps represent recommendations in conjunction with the installation of a MGK with a low loss header.
Select pumps in accordance with the respective system if no low loss header is to be installed.

MGK	Wilo	Grundfos
130	Stratos 25/1-8 screwed 1½“	Magna 25-80 screwed 1½“
170	Stratos 30/1-10 screwed 2“	Magna 32-80 screwed 2“
210	Stratos 30/1-12 screwed 2“	Magna 32-100 screwed 2“
250	Stratos 32/1-12 flanged	Magna 32-120 F flanged
300	Stratos 32/1-12 flanged	Magna 32-120 F flanged

Ventilation air/flue gas routing



Connection types

Boiler type	Gas boiler type 1)	Category Germany	Operating mode		Can be connected to				
			Open flue	Balanced flue	Moisture-resistant chimney	Room sealed balanced flue	Room sealed balanced flue	Building Regulation approved Flue	Moisture-resistant flue
MGK	B23, B33, C33, C43, C53, C63, C83	II_{2H3P} 2)	Yes	Yes	C83	C43	C33, C53, C63	C53, C63	B23, C53, C83

1) For type B23, the combustion air is drawn from the installation room (open flue combustion equipment).

For type C, the combustion air is drawn through a sealed system from the outside (balanced flue combustion equipment)

Ventilation air / flue gas routing

Implementation versions, condensing boiler		Maximum length [1]					
		MGK					
		DN	-130	-170	-210	-250	-300
B23	Flue in a duct and combustion air directly via the boiler (open flue)	160 [2]	50 m	50 m	47 m	35 m	20 m
		200 [3]	50 m	50 m	50 m	50 m	50 m
B33	Connection to a moisture-resistant chimney with horizontal connection line	160 [2]	Calculation [1] to EN 13384-1				
		200 [3]					
C33	Combustion air supply and flue gas routing via the roof in a common pressure range [4]	160 [2]	Calculation [1] to EN 13384-1 (See also example C33)				
		200 [3]					
C33	Vertical concentric roof outlet through a pitched or flat roof, vertical concentric balanced flue for installation in a duct (each balanced flue)	160/225	15 m	15 m	13 m	8 m	3 m
		200/300	-	-	-	15 m	15 m
C43	Connection to a moisture-resistant balanced flue chimney (balanced flue)	160 [2]	Calculation [1] to EN 13384-1				
		200 [3]					
C53	Terminals of the ventilation air and flue are in different pressure ranges (balanced flue)	160 [2]	50 m	50 m	47 m	35 m	20 m
		200 [3]	50 m	50 m	50 m	50 m	50 m
C53	Connection to a flue run on an external wall with a horizontal concentric connection line (length: 2.5 m); balanced flue	160/225	50 m	50 m	35 m	5 m	-
		200/300	-	-	-	50 m	50 m
C63	The flue gas system has not been tested and certified with the appliance. It must meet the building requirements of the relevant country.	160	Calculation [1] to EN 13384-1 (RLU)				
		200					
C93	Vertical flue for duct installation with horizontal concentric connection line (length: 2.5 m); balanced flue	160	25 m	16 m	6 m	-	-
		200	30 m	32 m	32 m	26 m	32 m

[1] Available fan draught: **MGK-130 → Q_{max}/Q_{min} = 200 Pa / 10 Pa**

MGK-170, -210, -250, -300 → Q_{max}/Q_{min} = 150 Pa / 10 Pa

[2] Flue DN 160 made from PP with approval number CE 0036CPD9169003

[3] Flue DN 200 made from PP with approval number CE 0036CPD9169003

[4] Use exclusively original Wolf components

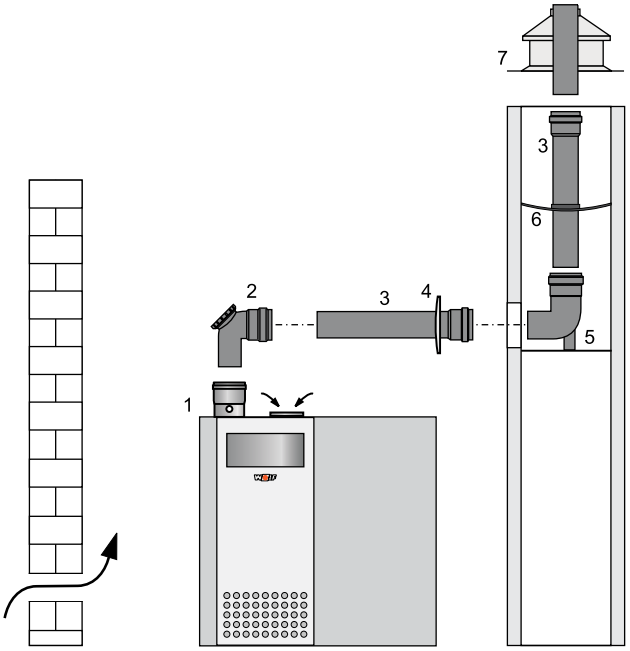
Examples for MGK system layout

1 Gas condensing boiler with integral flue gas test nipple
2 Inspection bend 87° DN 160
3 Flue pipe DN 160
Length: 500/1000/2000
4 Wall bezel
5 87° support bend DN 160 with support rail
6 Spacer
7 Ventilation air adaptor (for balanced flue operation)

Maintain the following clearance between the internal duct wall and the flue:
- 30 mm for circular ducts
- 20 mm for square ducts

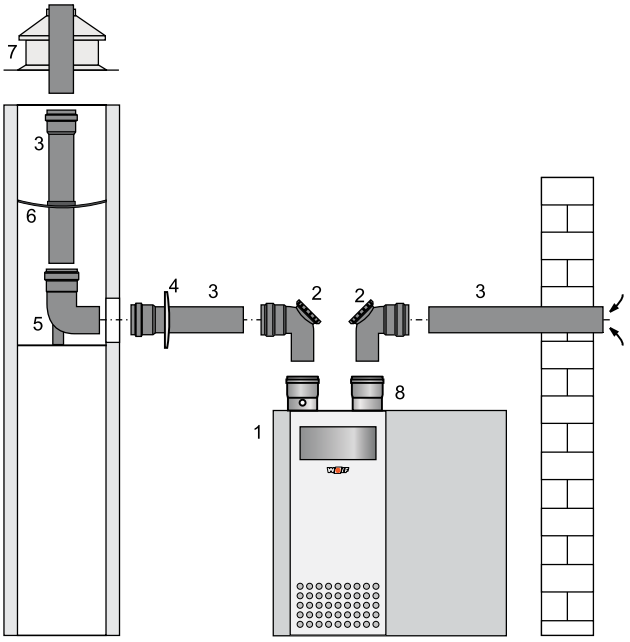
Example: open flue B 23

Install all horizontal ventilation air lines/flues with approx. 3% slope (5 cm/m) towards the appliance. Any condensate must flow back to the appliance.



Example: balanced flue C 53

Install all horizontal ventilation air lines/flues with approx. 3% slope (5 cm/m) towards the boiler. Any condensate must flow back to the appliance.



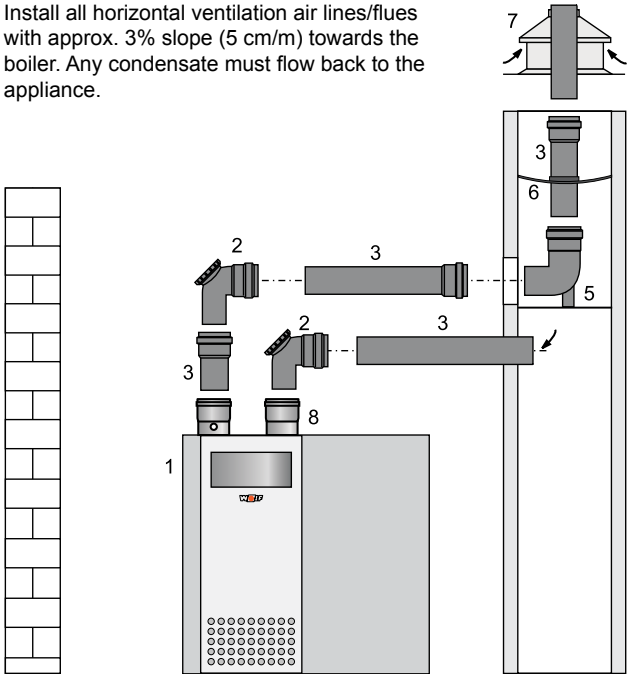
Examples for MGK system layout

1 Gas condensing boiler with integral flue gas test nipple
2 Inspection bends 87° DN 160
3 Flue pipes DN 160
Length: 500/1000/2000
4 Wall bezel
5 87° support bend DN 160 with support rail
6 Spacer
7 Ventilation air adaptor (for balanced flue operation)

Maintain the following clearance between the internal duct wall and the flue:
- 30 mm for circular ducts
- 20 mm for square ducts

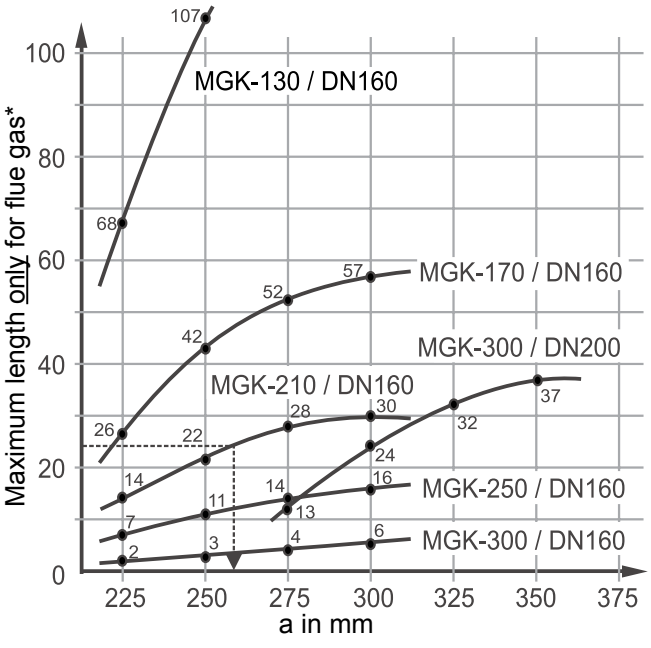
Example: balanced flue C93

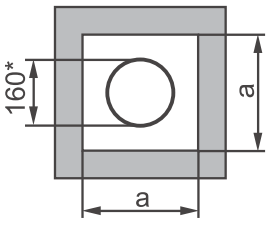
Install all horizontal ventilation air lines/flues with approx. 3% slope (5 cm/m) towards the boiler. Any condensate must flow back to the appliance.



Maximum length acc. to EN 13384-1 for DN 160. (DN 200 for MGK-300) subject to the duct cross-section
Example for C93

Combustion air:
In the adjacent diagram, the following pipework has been taken into consideration for the combustion air.
1 x 87° inspection bend = 2 m
1 x horizontal pipe = 2 m

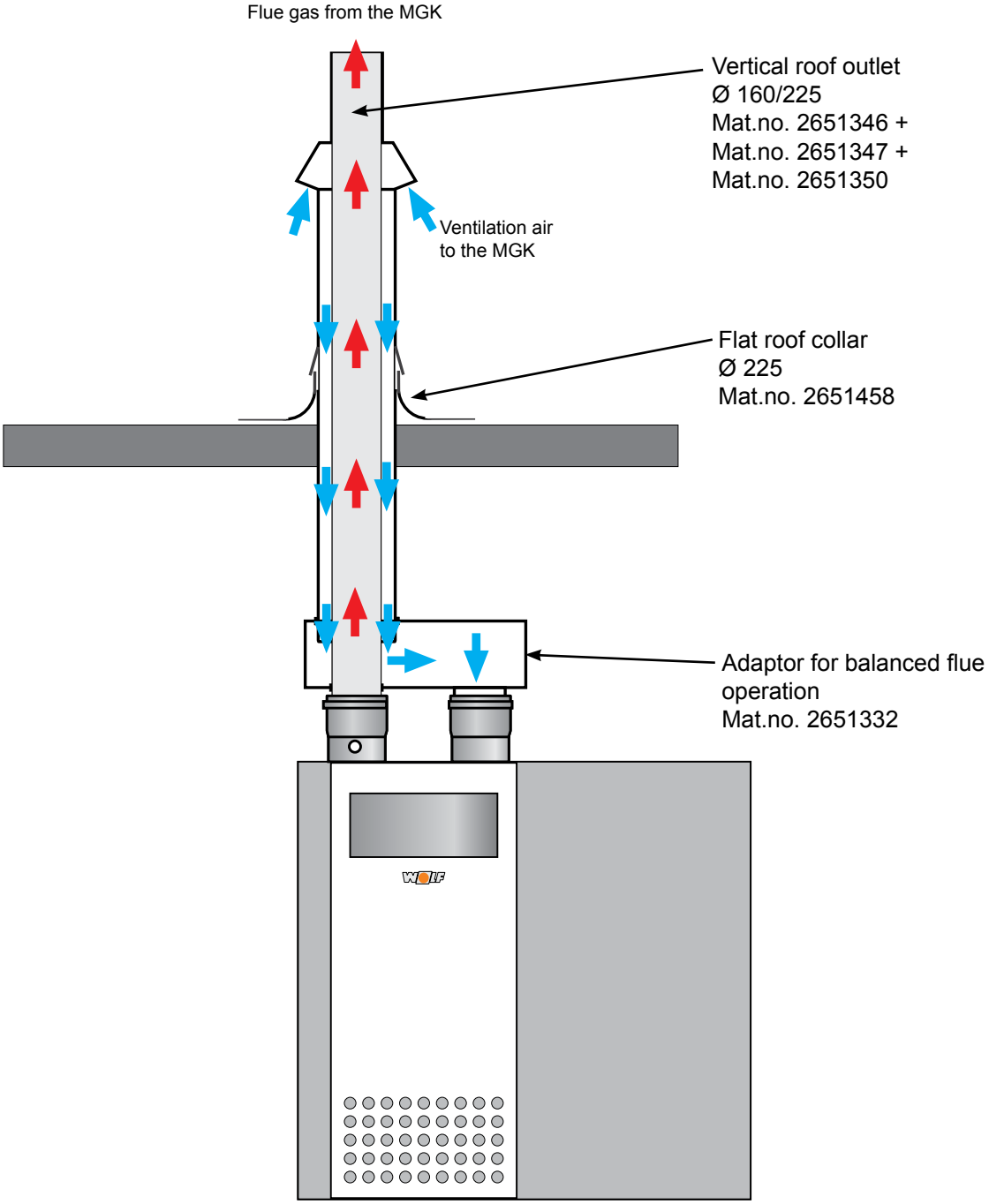




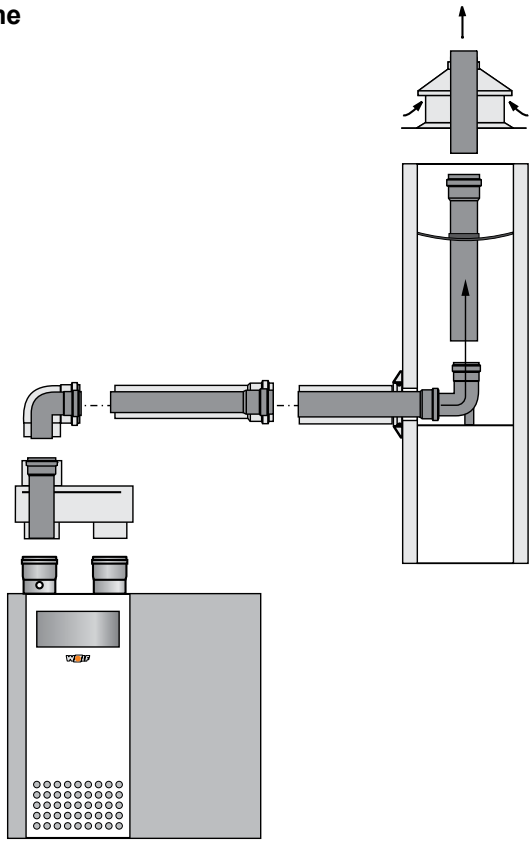
*Calculation principles:
Flue gas: 0.5 m + 87° + 2 m + 87° + duct length
Ventilation air: 87° + 2 m
Wall unevenness 5 mm
At the clip of the slide connection, the external flue pipe diameter is 183 mm.

Note:
Any other system configurations must be calculated in accordance with EN 13384-1.

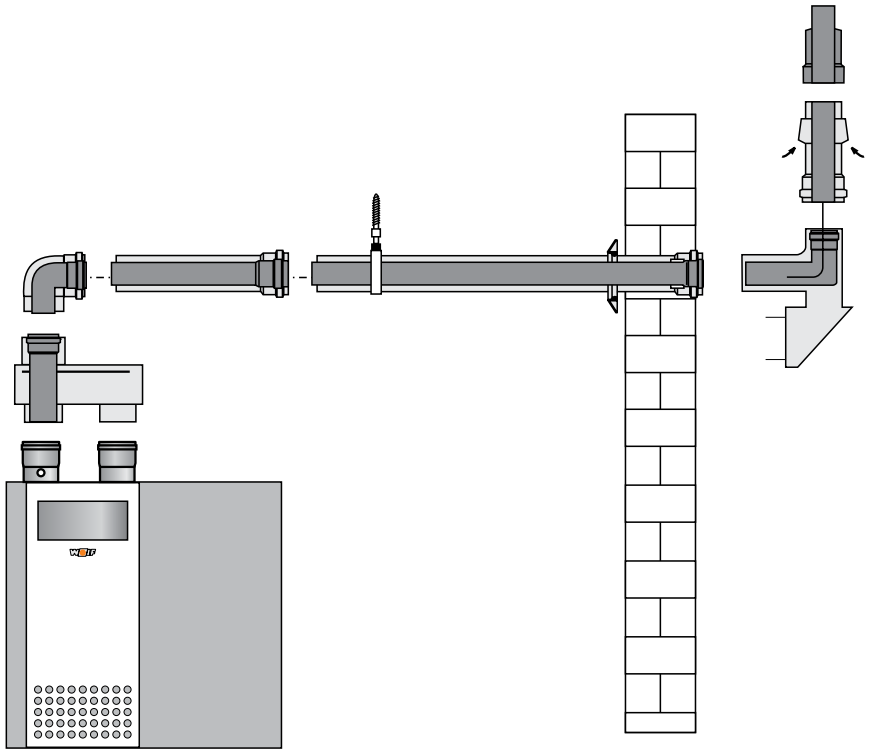
MGK scheme with vertical roof outlet, balanced flue



MGK concentric C93 scheme



MGK façade C53 scheme



General information

Where necessary, adapt the installation examples to the relevant Building Regulations and requirements of your country/region. Discuss any questions relating to the installation of inspection covers and ventilation apertures with your local flue gas inspector.

Flues inside chimney ducts must have secondary ventilation along their entire length and must terminate above the roof.

Flue gas cascades must be sized in accordance with EN 13384-1.

The requirements for installation rooms are specified in Building Regulations or Combustion Equipment Ordinances of the relevant countries. Observe all local regulations regarding the room ventilation.

With low outside temperatures, the water vapour contained in the flue gas may condense and freeze on the balanced flue. **This ice may fall from the roof causing injuries or material losses.** Use on-site measures to prevent ice from falling, e.g. the installation of a snow guard.

Flues must not be routed through other installation rooms without ducts, otherwise there would be a risk of the transfer of fire and there would be no mechanical protection.

NB The combustion air must not be drawn from chimneys that used to carry flue gases from oil or solid fuel boilers.

Secure the balanced flue or flue that is outside ducts with spacer brackets with a minimum clearance of 50 cm from the flue outlet or upstream/downstream of diverters to prevent the pipe joints being pulled apart. If this is not done, there is a danger of poisoning caused by escaping flue gas. Furthermore, boiler damage may result.

To prevent flue gas escaping, a positive pressure flue cascade is only permitted with a tested flue gas damper (part no. 2482896). For the MGK-130, this is already integrated.

Connection to a combustion air and flue system type C63 that has not been tested together with the gas combustion equipment.

Original Wolf components have been optimised over many years and are matched to the use with Wolf condensing boilers. When using third party equipment that is only CE-designated, the installer will be responsible for the correct sizing and perfect function of such systems. Faults, material losses and injuries resulting from incorrect pipe lengths, excessive pressure drop, premature wear with escaping flue gas and condensate or incorrect function, e.g. through components working themselves loose, are excluded from our warranty if non-CE-approved third party equipment is used.

NB **If the combustion air is taken from a duct the coonduit has to be free of contaminations!**

Connection to the ventilation air system and the flue

The unobstructed cross-section of flues must be able to be inspected. Therefore, install an inspection and/ or test aperture inside the boiler room; agree suitable arrangements with your local flue gas inspector.

Flue connections are created using couplings and gaskets. Always arrange couplings against the direction of the condensate flow.

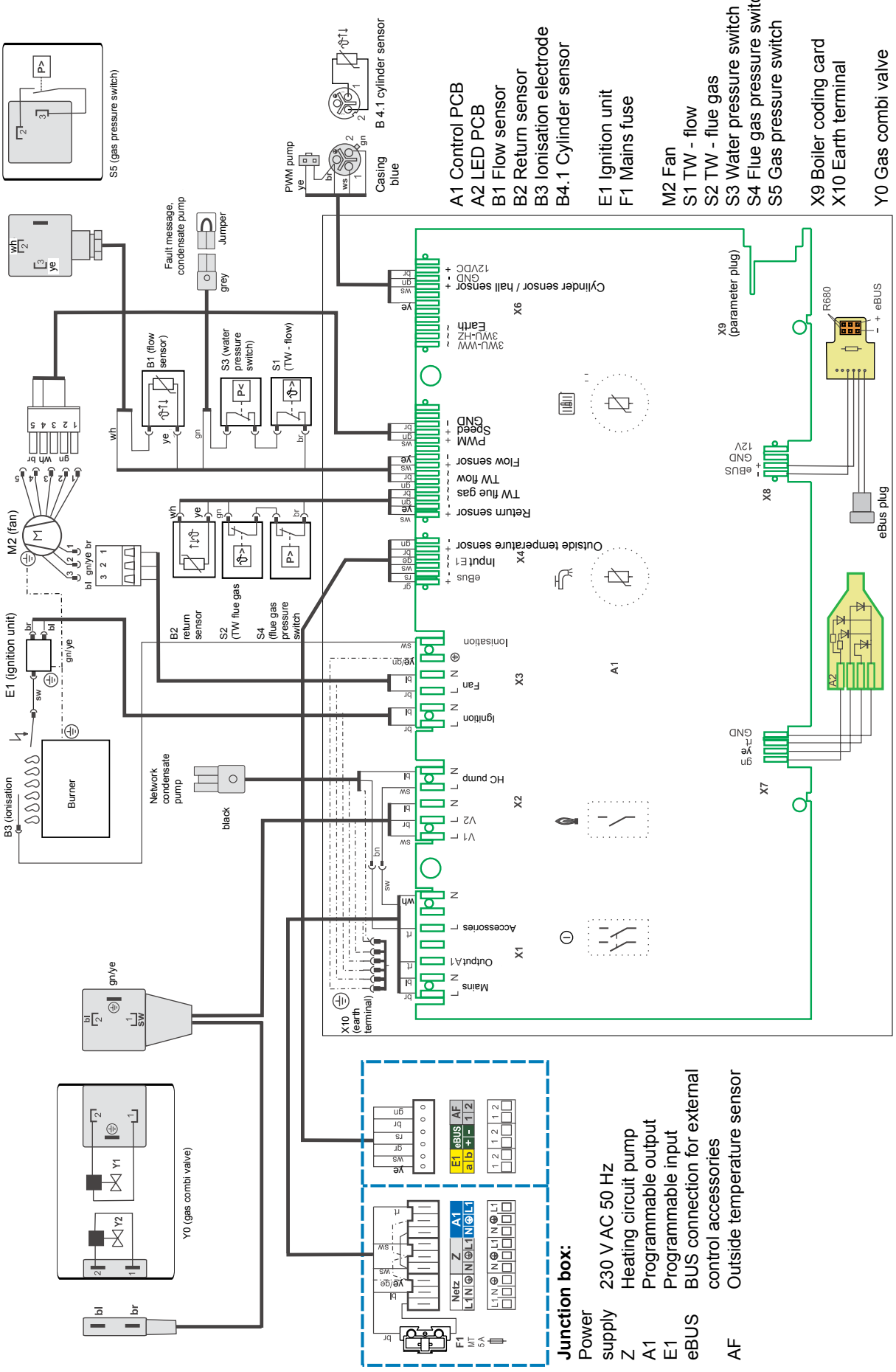
Install the ventilation air system / flue with a slope of at least 3° towards the gas condensing boiler. Spacer brackets should be fitted to secure the equipment in position. In the worst case scenario, a lesser slope of the balanced flue may lead to corrosion or operating faults.

NB Generally bevel or deburr trimmed flues to ensure a gas tight installation of pipe joints. Ensure that gaskets are correctly fitted. Remove all contamination prior to installation - never fit damaged parts.

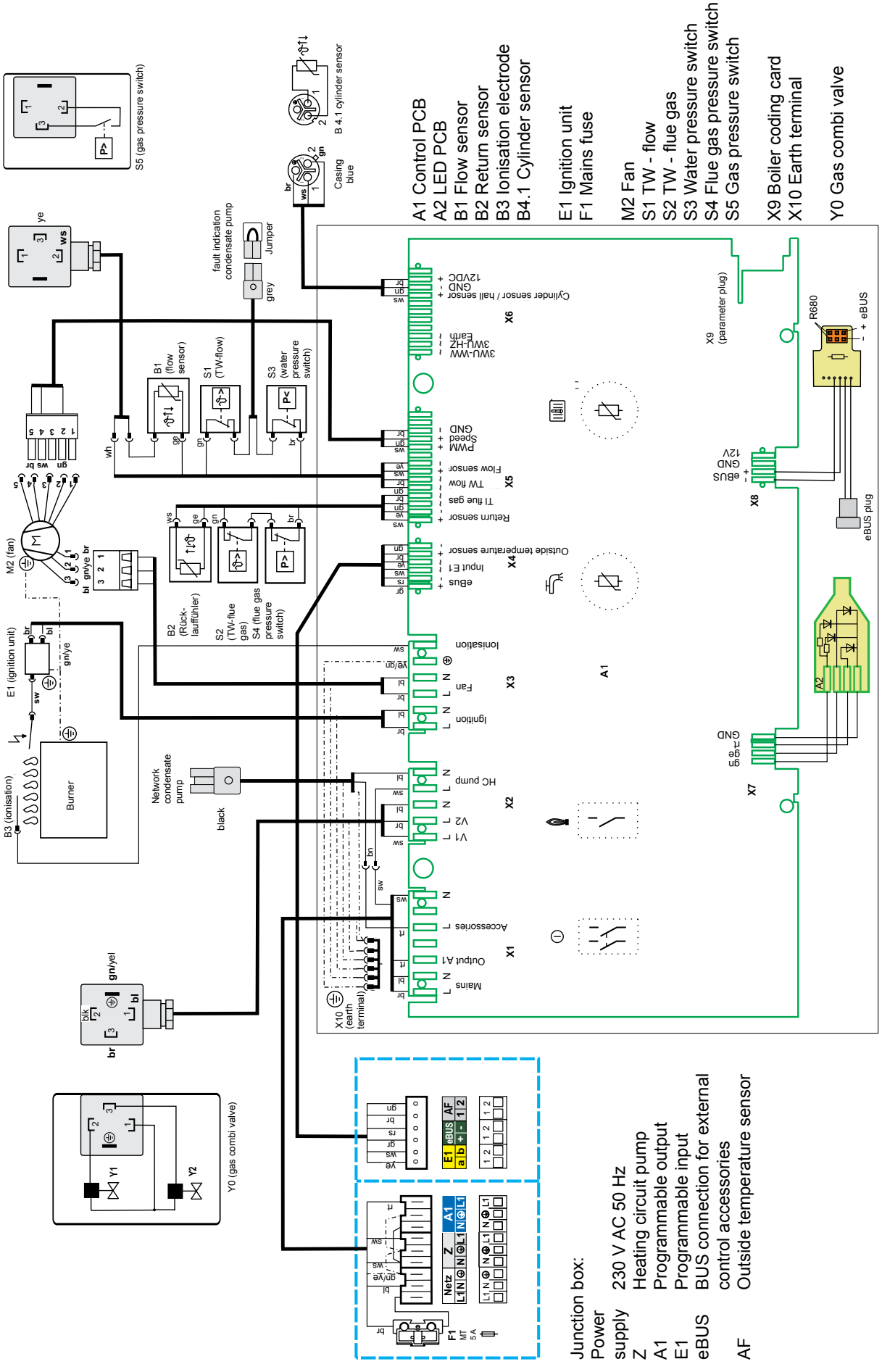
NB When sizing flue gas systems in accordance with EN 13384-1, maintain a maximum back pressure of up to 130Pa in to header line; this should also not be exceeded.

As protection against contamination during the building phase, we recommend the use of the complete ventilation air filter for MGK-130 to 300 (part no. 9751390). The ventilation air filter is plugged into the air intake.

NB Keep the door of the condensing boiler shut during the building phase. After completing the building phase, remove the filter.


A1 Control PCB
A2 LED PCB
B1 Flow sensor
B2 Return sensor
B3 Ionisation electrode
B4.1 Cylinder sensor
E1 Ignition unit
F1 Mains fuse
M2 Fan
S1 TW - flow
S2 TW - flue gas
S3 Water pressure switch
S4 Flue gas pressure switch
S5 Gas pressure switch
X9 Boiler coding card
X10 Earth terminal
Y0 Gas combi valve
Junction box:
Power supply 230 V AC 50 Hz
Z Heating circuit pump
A1 Programmable output
E1 Programmable input
eBUS BUS connection for external control accessories
AF Outside temperature sensor
S5 (gas pressure switch)
B 4.1 cylinder sensor
Casing blue
PWM pump ye
Fault message, condensate pump
Jumper
grey
B1 (flow sensor)
S3 (water pressure switch)
S1 (TW - flow)
M2 (fan)
E1 (ignition unit)
B2 return sensor
S2 (TW flue gas
S4 (flue gas pressure switch
B3 (ionisation
Burner
Network condensate pump
black
Y0 (gas combi valve)
X10 (earth terminal)
Cylinder sensor / hall sensor
Flow sensor
TW flue gas
TW flow
Return sensor
Outside temperature sensor
Ionisation
Fan
Ignition
HC pump
Accessories
Output A1
Mains
X1
X2
X3
X4
X6
X7
X8
X9 (parameter plug)
R680
eBus plug
A1
A2

Wiring diagram MGK-170-300



Troubleshooting

Any faults will be displayed as fault codes by Wolf controllers with eBUS capability. Cause and remedy may be allocated to these faults using the following table. This table is designed to allow your local heating contractor to trace the fault more easily.

Fault code	Fault	Cause	Remedy
1	TBV excess temperature, water pressure too low, fault condensate pump	The flow temperature has exceeded the limit for the TBV shutdown temperature, or the condensate lifting pump (accessory) has developed a fault or the water pressure switch switches off at a pressure < 1.0 bar	Check the system pressure. Check the heating circuit pump. Vent the system. Press the reset button Check the condensate pump Increase system pressure
4	No flame builds	No flame builds during burner start	Check the gas supply line and open the gas valve, if necessary Check the ignition electrode and ignition cable. Press reset
5	Flame failure during operation	Flame failure within 15 s after flame detection	Check CO_2 values. Check ionisation electrode and cable. Press the reset button
6	TW excess temperature	The flow/return temperature has exceeded the limit for the TW shutdown temperature	Check the system pressure. Vent the system. Increase pump speed
7	TBA excess temperature, overpressure in the flue gas system	The flue gas temperature has exceeded the limit for the TBA shutdown temperature, flue gas system is blocked, ventilation air is blocked	Clean the heat exchanger, check the flue gas system Check ventilation air system Check flue gas pressure switch
11	Flame pretence	A flame is recognised before the burner starts	Press the reset button
12	Faulty flow sensor, gas pressure too low	The flow temperature sensor or lead is faulty. Gas pressure < than the value set at the gas pressure switch (only displayed after 15 min)	Check lead Check the flow sensor Check gas pressure Check the gas pressure switch settings
14	Cylinder sensor faulty	DHW temperature sensor or lead faulty	Check sensor and lead
15	Outside temperature sensor faulty	The outside temperature sensor or cable is faulty	Check lead Check the outside temperature sensor
16	Return sensor faulty	The return temperature sensor or lead is faulty	Check lead Replace the return sensor
20	Fault, gas valve "1"	A flame is detected for 15 s after burner operation, even though gas valve 1 has received a shutdown command	Replace the gas combination valve
21	Fault, gas valve "2"	A flame is detected for 15 s after burner operation, even though gas valve 2 has received a shutdown command	Replace the gas combination valve
24	Gas fan fault	The gas fan does not reach the required pre-purging speed	Check the gas fan supply cable and the gas fan; press the reset button
25	Gas fan fault	The gas fan does not reach the ignition speed	Check the gas fan supply cable and the gas fan; press the reset button
26	Gas fan fault	The gas fan does not stop	Check the gas fan supply cable and the gas fan; press the reset button
30	CRC fault, gas condensing boiler	The EEPROM record "Gas condensing boiler" is invalid	Switch the power supply OFF and ON. If unsuccessful, replace the control PCB
31	CRC fault burner	The EEPROM record "Burner" is invalid	Switch the power supply OFF and ON. If unsuccessful, replace the control PCB
32	24 V AC supply faulty	24 V AC supply outside the permissible range (e.g. short circuit)	Check the gas fan

Fault code	Fault	Cause	Remedy
33	CRC fault; default values	The EEPROM record "Master reset" is invalid	Replace the control PCB
34	CRC error BCC	Parameter plug error	Exchange parameter plug
35	BCC missing	Parameter plug has been removed	Plug in the correct parameter plug
36	CRC error BCC	Parameter plug error	Exchange parameter plug
37	Wrong BCC	The parameter plug is not compatible with the control board	Plug in the correct parameter plug
38	BCC no. invalid	Parameter plug error	Exchange parameter plug
39	BCC system error	Parameter plug error	Parameterstecker wechseln
41	Flow monitoring	Return temperature > Flow + 25 K	Vent the heating system, check the system pressure. Check the heating circuit pump
43	Burner starts > 20 per hour	Flow rate through the heat exchanger too low or, in case of cascade, measuring point of the header temperature unsuitable, or power consumption of the calorifier charging too low.	Check the flow rate; Header sensor must measure the common feed temperature of the cascade.
50	Activation of the parameter plug	The parameter plug is still to be activated	Press the reset button twice
52	Activation of the parameter plug	The parameter plug is still to be activated	Press the reset button twice
60	Ionisation current fluctuates	The siphon is blocked, or the flue gas system is blocked, severe storm	Clean siphon, check flue gas system, check ventilation air, check monitoring electrode
61	Ionisation current fails	Poor gas quality, monitoring electrode faulty, severe storm	Check monitoring electrode and lead
	LED constantly red	Ionisation cable shorted out or ionisation electrode earthed (casing)	Check ionisation cable and position of electrode to burner. Press the reset button

Resistance table

NTC
Sensor resistances

Boiler sensor, cylinder sensor, solar cylinder sensor, outside temperature sensor, return sensor, flow sensor, header sensor

Temp. °C	Resist. Ω	Temp. °C	Resist. Ω	Temp. °C	Resist. Ω	Temp. °C	Resist. Ω
-21	51393	14	8233	49	1870	84	552
-20	48487	15	7857	50	1800	85	535
-19	45762	16	7501	51	1733	86	519
-18	43207	17	7162	52	1669	87	503
-17	40810	18	6841	53	1608	88	487
-16	38560	19	6536	54	1549	89	472
-15	36447	20	6247	55	1493	90	458
-14	34463	21	5972	56	1438	91	444
-13	32599	22	5710	57	1387	92	431
-12	30846	23	5461	58	1337	93	418
-11	29198	24	5225	59	1289	94	406
-10	27648	25	5000	60	1244	95	393
-9	26189	26	4786	61	1200	96	382
-8	24816	27	4582	62	1158	97	371
-7	23523	28	4388	63	1117	98	360
-6	22305	29	4204	64	1078	99	349
-5	21157	30	4028	65	1041	100	339
-4	20075	31	3860	66	1005	101	330
-3	19054	32	3701	67	971	102	320
-2	18091	33	3549	68	938	103	311
-1	17183	34	3403	69	906	104	302
0	16325	35	3265	70	876	105	294
1	15515	36	3133	71	846	106	285
2	14750	37	3007	72	818	107	277
3	14027	38	2887	73	791	108	270
4	13344	39	2772	74	765	109	262
5	12697	40	2662	75	740	110	255
6	12086	41	2558	76	716	111	248
7	11508	42	2458	77	693	112	241
8	10961	43	2362	78	670	113	235
9	10442	44	2271	79	670	114	228
10	9952	45	2183	80	628	115	222
11	9487	46	2100	81	608	116	216
12	9046	47	2020	82	589	117	211
13	8629	48	1944	83	570	118	205

Declaration of conformity
(acc. to ISO/IEC 17050-1)

No.	3062880
Issued by:	**Wolf GmbH**
Address:	Industriestraße 1, D-84048 Mainburg
Product:	Gas condensing boiler MGK

The product described above conforms to the requirements specified in the following documents:

§ 6, 1.BImSchV, 26.01.2010
DIN EN 437, 09/2009
DIN EN 483, 06/2000
DIN EN 677, 08/1998
DIN EN 60335-1, 02/2007
DIN EN 60335-2-102 / 2010
DIN EN 55014-1, 06/2007

In accordance with the following Directives:

2009/142/EEC (Gas Appliances Directive)
92/42/EW (Efficiency Directive)
2004/108//EC (EMC Directive)
2006/95/EC (Low Voltage Directive)

This product is identified as follows:

CE
0085

Mainburg, 23.11.2012

Gerdewan Jacobs
Executive Board Engineering

i. V. Klaus Grabmaier
Product approval